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INTRODUCTION

The Air Force Office of Scientific Research Technical Report Summaries is published quarterly (March, June, September, and December). It contains a brief summary of each technical report received in the Technical Information Division and submitted to the Defense Technical Information Center (DTIC) for that quarter. Three indexes, subject, personal author and title are provided to help the user locate reports that may be of interest.

AFOSR does not maintain copies of technical reports for distribution. However, you may obtain any of these reports if you are registered with DTIC, by requesting the AD number of that report from the DTIC, Cameron Station, Alexandria, Virginia, 22314.

PURPOSE

The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

AFOSR MISSION

The Air Force Office of Scientific Research (AFOSR) is the Single Manager of the Air Force Defense Research Sciences Program (Program Element 61102F) and the primary Air Force agency for the extramural support of fundamental scientific research. The AFOSR is organized under the Air Force Systems Command, DCS/Technology.

AFOSR awards grants and contracts for research in areas of science relevant to the needs of the Air Force. Research is selected for support from proposals received in response to the Broad Agency Announcement originating from scientists investigating problems involving the search for new knowledge and the expansion of scientific principles. Selection is on the basis of scientific potential for improving Air Force operational capabilities, originality, significance to science, the qualification of the principal investigators, and the reasonableness of the proposed budget.

KEY TO READING THE DATA

The summaries consist of three indexes and the abstracts. From one of the indexes, locate the AD number of the report that is of interest to you. Use this number to locate the abstract of the report in the abstracts section. The first report submitted to DTIC during the quarter (the one with the lowest AD number) appears on the last page of the abstracts section. The last report submitted to DTIC during the quarter (the one with the highest DTIC number) appears on the first page of the abstracts section. The following terms will give you a brief description of the elements used in each summary of this report.

DTIC Report Bibliography - DTIC's brief description of a technical report.

Search Control Number - A number assigned by DTIC at the time a bibliography is printed.

AD Number - A number assigned to each technical report when received by the DTIC.

Field & Group Numbers - (appearing after the AD number) First number is the subject field, and the second number is the particular group under that subject field.

Corporate Author/Performing Organization - The organization; e.g., college/university, company, etc., at which the research is conducted.

Title - The title of the technical report.

Descriptive Note - Gives the type of report; e.g., final, interim, etc., and the period of the time of the research.

Date - Date of the technical report.

Pages - Total number of pages contained in the technical report.

Personal Author - Person or persons who wrote the report.

Contract/Grant Number - The instrument control number identifying the contracting activity and funding year under which the research is initiated.

Project Number - A number unique to a particular area of science; e.g., 2304 is the project number for mathematics.

Task Number - An alphanumeric number unique to a specific field of the main area of science; e.g., 2304 is the project number for mathematics and A3 is the task number for computational sciences.

Monitor Number - The number assigned to a particular report by the government agency monitoring the research. The number consists of the government monitor acronym, the present calendar year and the technical report assigned consecutively; e.g., AFOSR-TR-83-0001 is the first number used for the first technical report processed for Calendar Year 1983.

Supplementary Note - A variety of statements pertaining to a report. For example, if the report is a journal article, the supplementary note might give you the journal citation, which will include the name of the journal the article it appears in, and the volume number, date, and the page numbers of the journal.

Abstract - A brief summary describing the research of the report.

Descriptors - Key words describing the research.

Identifiers - Commonly used designators, such as names of equipment, names of projects or acronyms, the AFOSR project and task number, and the Air Force Research Program Element number.

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(AFOSR-TR-90-1118)
F AD-A228 541

*AFOSR-87-0185
OREGON STATE UNIV CORVALLIS
(AFOSR-TR-90-0812)
F AD-A225 356
OREGON STATE UNIV CORVALLIS DEPT OF FISHERIES AND WILDLIFE

(AFOSR-TR-90-0670)
AD-A223 537

*AFOSR-87-0189
COLORADO STATE UNIV FORT COLLINS
DEPT OF PHYSIOLOGY AND BIOPHYSICS
(AFOSR-TR-90-1184)
F AD-A230 072

*AFOSR-87-0196
STANFORD UNIV CA DEPT OF
OPERATIONS RESEARCH
(AFOSR-TR-90-0662)
F AD-A224 328

*AFOSR-87-0199
SOUTHERN METHODIST UNIV DALLAS TX
DEPT OF COMPUTER SCIENCE AND
ENGINEERING
SMU-5-25104D
(AFOSR-TR-90-1088)
F AD-A228 542

*AFOSR-87-0204
UTAH UNIV SALT LAKE CITY DEPT OF
MECHANICAL ENGINEERING
(AFOSR-TR-90-0937)
F AD-A227 307

*AFOSR-87-0210
DENVER UNIV CO DEPT OF CHEMISTRY
(AFOSR-TR-90-1162)
F AD-A229 480

*AFOSR-87-0217
CALIFORNIA UNIV IRVINE DEPT OF
PHYSICS
(AFOSR-TR-90-0761)
F AD-A224 282

*AFOSR-87-0229
MASSACHUSETTS INST OF TECH
CAMBRIDGE
(AFOSR-TR-90-1148)
F AD-A229 126

*AFOSR-87-0233
UTAH UNIV SALT LAKE CITY DEPT OF
MATERIALS SCIENCE AND ENGINEERING
(AFOSR-TR-90-0950)
F AD-A226 966

*AFOSR-87-0237
ARIZONA STATE UNIV TEMPE DEPT OF
MECHANICAL AND AEROSPACE
ENGINEERING
(AFOSR-TR-90-0886)
F AD-A226 351

*AFOSR-87-0242
PENNSYLVANIA STATE UNIV
UNIVERSITY PARK COMPOSITES
MANUFACTURING TECHNOLOGY C ENTER
CMTC-8945
(AFOSR-TR-90-0569)
F AD-A222 549
CMTC-8945
(AFOSR-TR-90-0570)
F AD-A223 696

*AFOSR-87-0247
RICE UNIV HOUSTON TX DEPT OF
ELECTRICAL AND COMPUTER
ENGINEERING
(AFOSR-TR-90-0809)
F AD-A224 728

*AFOSR-87-0252
WASHINGTON UNIV ST LOUIS MO DEPT
OF SYSTEMS SCIENCE AND
MATHEMATICS
(AFOSR-TR-90-0947)
F AD-A227 366

*AFOSR-87-0282
STANFORD UNIV CA DEPT OF
PSYCHOLOGY
(AFOSR-TR-90-1175)
F AD-A230 415

*AFOSR-87-0285
STANFORD UNIV CA DEPT OF
MECHANICAL ENGINEERING
(AFOSR-TR-90-1027)
F AD-A227 835

*AFOSR-87-0287
MARYLAND UNIV COLLEGE PARK
(AFOSR-TR-90-1211)
F AD-A230 417

*AFOSR-87-0291
CALIFORNIA UNIV SANTA BARBARA
DEPT OF MATERIALS
TR-8
(AFOSR-TR-90-1139)
F AD-A229 029

*AFOSR-87-0301
PRINCETON UNIV NJ
(AFOSR-TR-90-0967)
F AD-A226 823

*AFOSR-87-0308
GEORGIA INST OF TECH ATLANTA
SCHOOL OF ELECTRICAL ENGINEERING
(AFOSR-TR-90-0585)
AD-A222 328

*AFOSR-87-0315
WISCONSIN UNIV-MADISON CENTER
FOR MATHEMATICAL SCIENCES
(AFOSR-TR-90-0868)
AD-A226 252

*AFOSR-87-0342
WAYNE STATE UNIV DETROIT MI DEPT
OF PHYSICS AND ASTRONOMY
(AFOSR-TR-90-1138)
F AD-A229 486

*AFOSR-87-0348
NATIONAL HELLENIC RESEARCH
FOUNDATION ATHENS (GREECE)
THEORETICAL AND PHYSICA L
CHEMISTRY INST
(AFOSR-TR-90-0764)
AD-A224 611

*AFOSR-87-0361
CALIFORNIA UNIV LOS ANGELES
MENTAL RETARDATION RESEARCH
CENTER
(AFOSR-TR-90-0730)
F AD-A225 006

*AFOSR-87-0362
WASHINGTON UNIV SEATTLE DEPT OF
CHEMISTRY
(AFOSR-TR-90-0896)
AD-A225 903

*AFOSR-87-0366
WASHINGTON UNIV SEATTLE DEPT OF

AERONAUTICS AND ASTRONAUTICS
(AFOSR-TR-90-1119)
F AD-A229 435

*AFOSR-87-0368
OKLAHOMA UNIV NORMAN DEPT OF
MATHEMATICS
(AFOSR-TR-90-1158)
F AD-A229 527

*AFOSR-87-0372
MINNESOTA UNIV ST PAUL
(AFOSR-TR-90-1149)
F AD-A229 082

*AFOSR-87-0386
DUKE UNIV DURHAM NC DEPT OF
COMPUTER SCIENCE
(AFOSR-TR-90-1080)
A AD-A229 195

*AFOSR-87-0388
MARYLAND UNIV COLLEGE PARK
0388-1
(AFOSR-TR-90-1097)
A AD-A228 949

*AFOSR-87-0400
PENNSYLVANIA STATE UNIV
UNIVERSITY PARK DEPT OF COMPUTER
SCIENCE
(AFOSR-TR-90-1121)
A AD-A229 432

*AFOSR-88-0006
MASSACHUSETTS UNIV AMHERST DEPT
OF CIVIL ENGINEERING
(AFOSR-TR-90-0882)
F AD-A226 437

*AFOSR-88-0010
ARIZONA UNIV TUCSON OPTICAL
SCIENCES CENTER
(AFOSR-TR-90-1101)
F AD-A228 940

*AFOSR-88-0011
CALIFORNIA UNIV BERKELEY DEPT OF
MECHANICAL ENGINEERING
(AFOSR-TR-90-1026)
F AD-A227 048

*AFOSR-88-0027
CALIFORNIA UNIV LOS ANGELES DEPT
OF PHYSICS
(AFOSR-TR-90-1102)
F AD-A228 969

*AFOSR-88-0029
MASSACHUSETTS INST OF TECH
CAMBRIDGE DEPT OF AERONAUTICS AND
ASTRONAUTICS
(AFOSR-TR-90-0837)
F AD-A224 504

*AFOSR-88-0033
ILLINOIS UNIV AT URBANA COLL OF
VETERINARY MEDICINE
(AFOSR-TR-90-1117)
F AD-A228 540

*AFOSR-88-0041
FLORIDA UNIV GAINESVILLE QUANTUM
THEORY PROJECT
(AFOSR-TR-90-0583)
F AD-A222 631

*AFOSR-88-0043
COLUMBIA UNIV NEW YORK DEPT OF
CHEMISTRY
(AFOSR-TR-90-0759)
AD-A224 356

*AFOSR-88-0048
CALIFORNIA UNIV BERKELEY DEPT OF
MATHEMATICS
CPAM-435
(AFOSR-TR-90-0734)
F AD-A223 636

*AFOSR-88-0052
SIBLEY SCHOOL OF MECHANICAL AND
AEROSPACE ENGINEERING ITHACA NY
(AFOSR-TR-90-0678)
AD-A223 365

*AFOSR-88-0061
BROWN UNIV PROVIDENCE RI DIV OF
ENGINEERING
(AFOSR-TR-90-0777)
F AD-A224 467

*AFOSR-88-0068
NEW ORLEANS UNIV LA DEPT OF
CHEMISTRY
(AFOSR-TR-90-0963)
AD-A226 836

*AFOSR-88-0075
DREXEL UNIV PHILADELPHIA PA DEPT
OF MATERIALS ENGINEERING
(AFOSR-TR-90-0873)
F AD-A226 479

*AFOSR-88-0084
TEXAS UNIV AT AUSTIN DEPT OF
CHEMISTRY
(AFOSR-TR-90-1095)
AD-A228 879
(AFOSR-TR-90-1093)
AD-A228 908
(AFOSR-TR-90-1094)
AD-A229 072

*AFOSR-88-0105
OREGON STATE UNIV CORVALLIS DEPT
OF MATHEMATICS
(AFOSR-TR-90-1197)
F AD-A230 226

*AFOSR-88-0107
MARYLAND UNIV COLLEGE PARK DEPT
OF AEROSPACE ENGINEERING
(AFOSR-TR-90-1134)
F AD-A229 015

*AFOSR-88-0112
VIRGINIA POLYTECHNIC INST AND
STATE UNIV BLACKSBURG
(AFOSR-TR-90-1091)
F AD-A229 006

*AFOSR-88-0114
CLARKSON UNIV POTSDAM NY DIV OF
RESEARCH
(AFOSR-TR-90-1036)
F AD-A227 018

*AFOSR-88-0117
NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION HAMPTON VA
LANGLEY RESEARCH CEN TER
(AFOSR-TR-90-0663)
F AD-A223 476

*AFOSR-88-0121
UNIVERSITY OF MANCHESTER INST OF SCIENCE AND TECHNOLOGY (UNITED KINGDOM) DEP T OF PHYSICS
(AFOSR-TR-90-0941)
F AD-A227 073

*AFOSR-88-0125
CHICAGO UNIV IL DEPT OF PSYCHOLOGY
(AFOSR-TR-90-0942)
F AD-A226 848

*AFOSR-88-0132
NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY
(AFOSR-TR-90-0890)
AD-A225 912
(AFOSR-TR-90-0893)
AD-A225 913
(AFOSR-TR-90-0887)
AD-A225 914
(AFOSR-TR-90-0888)
AD-A225 945
(AFOSR-TR-90-0891)
AD-A227 551
(AFOSR-TR-90-0889)
AD-A227 552

*AFOSR-88-0136
GEORGE WASHINGTON UNIV HAMPTON VA JOINT INST FOR ADVANCEMENT OF FLIGHT SCIENC ES
(AFOSR-TR-90-1033)
F AD-A227 409

*AFOSR-88-0139
STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS
(AFOSR-TR-90-0555)
F AD-A222 704

*AFOSR-88-0142
BAYLOR COLL OF MEDICINE HOUSTON TX
(AFOSR-TR-90-0750)
A AD-A224 121

*AFOSR-88-0143
COLORADO STATE UNIV FORT COLLINS DEPT OF ATMOSPHERIC SCIENCE
(AFOSR-TR-90-1113)
AD-A228 801

*AFOSR-88-0146
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF AEROSPACE ENGINEERING
(AFOSR-TR-90-0885)
F AD-A226 072

*AFOSR-88-0155
CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS
(AFOSR-TR-90-0762)
AD-A223 776

*AFOSR-88-0156
ILLINOIS UNIV AT CHICAGO CIRCLE
CRR-91023
(AFOSR-TR-90-1078)
F AD-A229 013

*AFOSR-88-0159
COLORADO STATE UNIV FORT COLLINS DEPT OF STATISTICS
(AFOSR-TR-90-0869)
F AD-A226 142

*AFOSR-88-0161
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF COMPUTER SCIENCE
(AFOSR-TR-90-1156)
F AD-A229 837

*AFOSR-88-0162
CALIFORNIA UNIV BERKELEY SPONSORED PROJECTS OFFICE
(AFOSR-TR-90-1181)
A AD-A230 281

*AFOSR-88-0163
ARIZONA UNIV TUCSON DEPT OF AEROSPACE AND MECHANICAL ENGINEERING
(AFOSR-TR-90-1131)
F AD-A229 007

*AFOSR-88-0171
RUTGERS - THE STATE UNIV NEW BRUNSWICK NJ DEPT OF PSYCHOLOGY
(AFOSR-TR-90-0978)
AD-A226 782

*AFOSR-88-0174
CALIFORNIA UNIV BERKELEY
(AFOSR-TR-90-0871)
A AD-A226 144

*AFOSR-88-0175
CALIFORNIA UNIV SANTA BARBARA CENTER FOR COMPUTATIONAL SCIENCES AND ENGINEERI NG
(AFOSR-TR-90-1221)
F AD-A230 543

*AFOSR-88-0179
TENNESSEE UNIV MEMPHIS DEPT OF ANATOMY AND NEUROBIOLOGY
(AFOSR-TR-90-0956)
A AD-A226 832

*AFOSR-88-0180
WASHINGTON STATE UNIV PULLMAN
(AFOSR-TR-90-1220)
F AD-A231 110

*AFOSR-88-0185
ILLINOIS UNIV AT URBANA DEPT OF MATHEMATICS
(AFOSR-TR-90-0732)
F AD-A223 640

*AFOSR-88-0186
OHIO STATE UNIV COLUMBUS DEPT OF ELECTRICAL ENGINEERING
(AFOSR-TR-90-0728)
F AD-A223 242

*AFOSR-88-0188
ARIZONA STATE UNIV TEMPE DEPT OF MATHEMATICS
(AFOSR-TR-90-1212)
F AD-A230 418

*AFOSR-88-189
ARIZONA UNIV TUCSON APPLIED MATHEMATICS PROGRAM
(AFOSR-TR-90-1194)
F AD-A230 165

*AFOSR-88-0191

INSTITUTE FOR CIRCADIAN PHYSIOLOGY
BOSTON MA
(AFOSR-TR-90-0755)
F AD-A224 227

*AFOSR-88-0202
CONNECTICUT UNIV STORRS DEPT OF
ELECTRICAL AND SYSTEMS
ENGINEERING
(AFOSR-TR-90-1196)
AD-A230 193

*AFOSR-88-0204
MARYLAND UNIV COLLEGE PARK
(AFOSR-TR-90-0964)
A AD-A226 828

*AFOSR-88-0216
OHIO STATE UNIV RESEARCH
FOUNDATION COLUMBUS
(AFOSR-TR-90-0677)
F AD-A223 765

*AFOSR-88-0220
ILLINOIS UNIV CHAMPAIGN
(AFOSR-TR-89-0804)
F AD-A225 480

*AFOSR-88-0228
BROWN UNIV PROVIDENCE RI DEPT OF
PHYSICS
(AFOSR-TR-90-0672)
F AD-A223 615

*AFOSR-88-0229
CORNELL UNIV ITHACA NY
(AFOSR-TR-90-0948)
F AD-A226 829

*AFOSR-88-0230
NEBRASKA UNIV LINCOLN DEPT OF
MATHEMATICS AND STATISTICS
(AFOSR-TR-90-1120)
F AD-A229 433

*AFOSR-88-0233
ILLINOIS UNIV AT URBANA DEPT OF
AERONAUTICAL AND ASTRONAUTICAL
ENGINEERING
AAE-90-7
(AFOSR-TR-90-1143)
F AD-A228 923

*AFOSR-88-0236
UNIVERSITY OF SOUTHERN CALIFORNIA
LOS ANGELES SIGNAL AND IMAGE
PROCESSING INS T
(AFOSR-TR-90-1174)
A AD-A230 108

*AFOSR-88-0238
DUKE UNIV DURHAM NC DEPT OF
PHYSICS
(AFOSR-TR-90-0895)
F AD-A225 997

*AFOSR-88-0241
COLORADO UNIV AT BOULDER
(AFOSR-TR-90-0687)
F AD-A223 412

*AFOSR-88-0249
EMORY UNIV ATLANTA GA DEPT OF
CHEMISTRY
(AFOSR-TR-90-1001)
AD-A226 680
(AFOSR-TR-90-0976)
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(AFOSR-TR-90-0973)
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(AFOSR-TR-90-0975)
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(AFOSR-TR-90-0974)
AD-A226 993

*AFOSR-88-0253
NEW HAMPSHIRE UNIV DURHAM DEPT OF
PHYSICS
(AFOSR-TR-90-1122)
F AD-A229 434

*AFOSR-88-0254
ARIZONA STATE UNIV TEMPE DEPT OF
MATHEMATICS
(AFOSR-TR-90-1090)
F AD-A229 004

*AFOSR-88-0255
GEORGIA UNIV ATHENS
(AFOSR-TR-89-0820)
F AD-A225 481

*AFOSR-88-0258
INTERNATIONAL NEURAL NETWORK
SOCIETY BETHESDA MD
(AFOSR-TR-90-1178)
F AD-A230 283

*AFOSR-88-0259
UNIVERSITY OF SOUTHERN CALIFORNIA
LOS ANGELES DEPT OF ELECTRICAL
ENGINEERING
(AFOSR-TR-90-1214)
F AD-A230 486
(AFOSR-TR-90-1214)
F AD-A230 487

*AFOSR-88-0261
PURDUE UNIV LAFAYETTE IN THERMAL
SCIENCES AND PROPULSION CENTER
(AFOSR-TR-90-0961)
F AD-A226 893

*AFOSR-88-0266
STANFORD UNIV CA
(AFOSR-TR-90-1106)
F AD-A228 873

*AFOSR-88-0277
GEORGIA UNIV RESEARCH FOUNDATION
INC ATHENS
(AFOSR-TR-90-0667)
AD-A223 461
(AFOSR-TR-90-0668)
AD-A223 473
(AFOSR-TR-90-0669)
AD-A223 474

*AFOSR-88-0279
KANSAS STATE UNIV MANHATTAN DEPT
OF CHEMISTRY
(AFOSR-TR-90-1114)
AD-A228 939

*AFOSR-88-0287
JOHNS HOPKINS UNIV BALTIMORE MD
DEPT OF BIOPHYSICS
(AFOSR-TR-90-0719)
F AD-A223 611

*AFOSR-88-0292
ROCHESTER UNIV NY CENTER FOR
VISUAL SCIENCE

(AFOSR-TR-90-0877)
AD-A226 335

*AFOSR-88-0308
CALIFORNIA UNIV DAVIS
(AFOSR-TR-90-1107)
F AD-A229 262

*AFOSR-88-0320
WISCONSIN UNIV-MILWAUKEE DEPT OF PSYCHOLOGY
(AFOSR-TR-90-1163)
A AD-A229 472

*AFOSR-88-0323
OREGON UNIV EUGENE DEPT OF PSYCHOLOGY
(AFOSR-TR-90-1213)
A AD-A230 489

*AFOSR-88-0324
PRINCETON UNIV NJ DEPT OF CIVIL ENGINEERING
PU/CEOR/SM-90-9
(AFOSR-TR-90-1182)
F AD-A229 964

*AFOSR-88-0327
STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING
(AFOSR-TR-90-1000)
AD-A226 665
(AFOSR-TR-90-0997)
AD-A226 918
STANFORD UNIV CA INFORMATION SYSTEMS LAB
(AFOSR-TR-90-0955)
F AD-A226 825

*AFOSR-88-0333
FLORIDA UNIV GAINESVILLE DEPT OF PSYCHOLOGY
(AFOSR-TR-90-0749)
A AD-A224 127

*AFOSR-88-0345
WASHINGTON STATE UNIV PULLMAN COLL OF PHARMACY
(AFOSR-TR-90-1146)
F AD-A229 065

*AFOSR-88-0354
STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS
(AFOSR-TR-90-0776)
F AD-A224 379

*AFOSR-89-0007
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES LOKER HYDROCARBON RESEARCH INST
(AFOSR-TR-90-0757)
AD-A224 111

*AFOSR-89-0015
BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS
LCDS-90-6
(AFOSR-TR-90-1136)
AD-A228 946

*AFOSR-89-0021
FLORIDA UNIV GAINESVILLE DEPT OF PSYCHOLOGY
(AFOSR-TR-90-1164)
F AD-A229 743

*AFOSR-89-0025
HOUSTON UNIV TX DEPT OF MATHEMATICS
(AFOSR-TR-90-0879)
F AD-A226 066

*AFOSR-89-0032
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES INST FOR ROBOTICS AND INTELLIGE NT SYSTEMS
(AFOSR-TR-90-0675)
F AD-A223 479

*AFOSR-89-0039
MATERIALS RESEARCH SOCIETY PITTSBURGH PA
(AFOSR-TR-90-0839)
F AD-A224 806

*AFOSR-89-0040
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY
(AFOSR-TR-90-0954)
AD-A226 838

(AFOSR-TR-90-0953)
AD-A226 839

*AFOSR-89-0043
NORTHWESTERN UNIV EVANSTON IL DEPT OF MATERIALS SCIENCE AND ENGINEERING
(AFOSR-TR-90-1151)
A AD-A229 143

*AFOSR-89-0045
CALIFORNIA INST OF TECH PASADENA DEPT OF ELECTRICAL ENGINEERING
(AFOSR-TR-90-1169)
A AD-A230 164

*AFOSR-89-0050
OREGON UNIV EUGENE DEPT OF PSYCHOLOGY
(AFOSR-TR-90-0729)
F AD-A224 845

*AFOSR-89-0051
PURDUE UNIV LAFAYETTE IN
(AFOSR-TR-90-1141)
A AD-A229 045

*AFOSR-89-0064
STANFORD UNIV CA DEPT OF PSYCHOLOGY
(AFOSR-TR-90-1216)
A AD-A231 109

*AFOSR-89-0065
STANFORD UNIV CA
(AFOSR-TR-90-1045)
AD-A226 847
STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING
(AFOSR-TR-90-1041)
AD-A226 994
(AFOSR-TR-90-1043)
AD-A226 995
(AFOSR-TR-90-1044)
AD-A226 996
(AFOSR-TR-90-1042)
AD-A226 997
(AFOSR-TR-90-1051)
AD-A227 135
STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

(AFOSR-TR-90-1050)
AD-A227 213

*AFOSR-89-0069
MASSACHUSETTS UNIV AMHERST DEPT OF POLYMER SCIENCE AND ENGINEERING
(AFOSR-TR-90-1199)
F AD-A230 175

*AFOSR-89-0071
COLLEGE OF WILLIAM AND MARY WILLIAMSBURG VA
(AFOSR-TR-90-0769)
AD-A224 524
(AFOSR-TR-90-0770)
AD-A224 525

*AFOSR-89-0074
COLORADO UNIV AT BOULDER
(AFOSR-TR-90-0883)
AD-A226 287

*AFOSR-89-0077
INDIANA UNIV AT BLOOMINGTON DEPT OF BIOLOGY
(AFOSR-TR-90-0665)
F AD-A224 766

*AFOSR-89-0083
CITY COLL NEW YORK
CUNY-MB89-03
(AFOSR-TR-90-0580)
AD-A222 852

*AFOSR-89-0085
OKLAHOMA STATE UNIV STILLWATER
(AFOSR-TR-90-1029)
AD-A226 599
OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY
(AFOSR-TR-90-0722)
AD-A223 455
(AFOSR-TR-90-0969)
AD-A226 795

*AFOSR-89-0091
PRINCETON UNIV NJ
(AFOSR-TR-90-0875)
F AD-A225 996

*AFOSR-89-0094
UTAH STATE UNIV LOGAN CENTER FOR ATMOSPHERIC AND SPACE SCIENCES
CASS-90-7-01
(AFOSR-TR-90-0878)
F AD-A226 332

*AFOSR-89-0099
ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY
(AFOSR-TR-90-0720)
AD-A223 423
(AFOSR-TR-90-0721)
AD-A223 453

*AFOSR-89-0111
CALIFORNIA UNIV LOS ANGELES DEPT OF ELECTRICAL ENGINEERING
(AFOSR-TR-90-1129)
F AD-A228 842

*AFOSR-89-0112
TEXAS A AND M RESEARCH FOUNDATION COLLEGE STATION
(AFOSR-TR-90-0773)
F AD-A224 730

*AFOSR-89-0118
TEXAS UNIV AT SAN ANTONIO
(AFOSR-TR-90-0683)
F AD-A223 491

*AFOSR-89-0119
MASSACHUSETTS INST OF TECH CAMBRIDGE PLASMA FUSION CENTER
(AFOSR-TR-90-0735)
F AD-A223 578

*AFOSR-89-0127
MICHIGAN UNIV ANN ARBOR
USMC-89-C-AF-1
(AFOSR-TR-90-0831)
F AD-A224 851
UMSC-89-C-AF-1
(AFOSR-TR-90-0831)
F AD-A225 100

*AFOSR-89-0131
ROCHESTER UNIV NY DEPT OF PHYSICS AND ASTRONOMY
(AFOSR-TR-90-0582)
F AD-A222 629

*AFOSR-89-0135
BOSTON UNIV MA COLL OF ENGINEERING
(AFOSR-TR-90-0970)
F AD-A226 784

*AFOSR-89-0149
UTAH UNIV SALT LAKE CITY DEPT OF PHYSICS
(AFOSR-TR-90-0830)
A AD-A224 763

*AFOSR-89-0155
ARIZONA STATE UNIV TEMPE DEPT OF MATHEMATICS
(AFOSR-TR-90-1035)
F AD-A226 793

*AFOSR-89-0172
RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CIVIL ENGINEERING
(AFOSR-TR-90-0664)
F AD-A223 514

*AFOSR-89-0179
TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY
(AFOSR-TR-90-0613)
AD-A222 500
(AFOSR-TR-90-0612)
AD-A222 556
(AFOSR-TR-90-0981)
AD-A226 834
(AFOSR-TR-90-0980)
AD-A226 845
(AFOSR-TR-90-0983)
AD-A226 850
(AFOSR-TR-90-0982)
AD-A227 037

*AFOSR-89-0180
ARIZONA STATE UNIV TEMPE
(AFOSR-TR-90-0870)
F AD-A226 143

*AFOSR-89-0188
MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(AFOSR-TR-90-0727)
F AD-A223 430

*AFOSR-89-0196
HAMPTON UNIV VA DEPT OF PHYSICS
(AFOSR-TR-90-1135)
F AD-A229 196

*AFOSR-89-0206
CALIFORNIA UNIV BERKELEY DEPT OF PSYCHOLOGY
(AFOSR-TR-90-0760)
A AD-A224 236

*AFOSR-89-0207
FLORIDA UNIV GAINESVILLE
(AFOSR-TR-90-0756)
AD-A224 112

*AFOSR-89-0209
TEXAS UNIV AT AUSTIN DEPT OF PHYSICS
(AFOSR-TR-90-1046)
F AD-A227 372

*AFOSR-89-0216
VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF ENGINEERING SCIEN CE AND MECHANICS
(AFOSR-TR-90-0563)
A AD-A222 702

*AFOSR-89-0219
PURDUE UNIV LAFAYETTE IN DEPT OF MEDICINAL CHEMISTRY AND PHARMACOGNOSY
(AFOSR-TR-90-0811)
F AD-A225 358

*AFOSR-89-0227
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
(AFOSR-TR-90-0966)
F AD-A226 824

*AFOSR-89-0231
SAN FRANCISCO STATE UNIV CA
(AFOSR-TR-90-1118)
AD-A228 922

*AFOSR-89-0233
VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ELECTRICAL ENGINEERING
UVA/525704/EE91/101
(AFOSR-TR-90-1179)
F AD-A230 167

*AFOSR-89-0234
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF CHEMISTRY
(AFOSR-TR-90-0568)
AD-A222 540
(AFOSR-TR-90-0979)
AD-A226 846
(AFOSR-TR-90-1048)
AD-A227 209

*AFOSR-89-0242
MINNESOTA UNIV MINNEAPOLIS DEPT OF PSYCHOLOGY
(AFOSR-TR-90-0783)
F AD-A224 569

*AFOSR-89-0254
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL AND COMPUTER ENGINEERIN G
(AFOSR-TR-90-1171)
F AD-A230 071

*AFOSR-89-0257
INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS INC PISCATAWAY NJ
(AFOSR-TR-90-0951)
F AD-A226 831

*AFOSR-89-0281
CALIFORNIA UNIV LOS ANGELES DEPT OF MECHANICAL AEROSPACE AND NUCLEAR ENGINEER ING
(AFOSR-TR-90-0676)
F AD-A223 678

*AFOSR-89-0288
JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MECHANICAL ENGINEERING
(AFOSR-TR-90-0765)
A AD-A224 509

*AFOSR-89-0293
PRINCETON UNIV NJ
(AFOSR-TR-90-0748)
A AD-A224 281

*AFOSR-89-0297
OHIO STATE UNIV COLUMBUS DEPT OF AERONAUTICAL AND ASTRONAUTICAL ENGINEERING
(AFOSR-TR-90-1030)
F AD-A226 816

*AFOSR-89-0300
ILLINOIS UNIV AT URBANA DEPT OF MATERIALS SCIENCE AND ENGINEERING
UILU-ENG-90-5017
(AFOSR-TR-90-1186)
A AD-A229 933

*AFOSR-89-0305
OREGON UNIV EUGENE DEPT OF PSYCHOLOGY
(AFOSR-TR-90-0945)
F AD-A226 788

*AFOSR-89-0311
MISSOURI UNIV-COLUMBIA DEPT OF PHYSICS
(AFOSR-TR-90-0772)
F AD-A224 382

*AFOSR89-0329
LABORATOIRE DE MECANIQUE ET TECHNOLOGIE CACHAN (FRANCE)
(AFOSR-TR-90-1128)
F AD-A229 403

*AFOSR-89-0334
CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL ENGINEERING AND MATE RIALS SCIENCE
(AFOSR-TR-90-1105)
F AD-A228 750

*AFOSR-89-0335
LOYOLA UNIV OF CHICAGO IL PARMLY HEARING INST
(AFOSR-TR-90-0754)
A AD-A224 147

*AFOSR-89-0336

INTERNATIONAL SOCIETY FOR
CHRONOBIOLOGY BELTSVILLE MD
(AFOSR-TR-90-1039)
F AD-A226 990

*AFOSR-89-0339
HAWAII INST OF GEOPHYSICS
HONOLULU
(AFOSR-TR-90-1176)
F AD-A230 204

*AFOSR-89-0344
ARKANSAS UNIV FOR MEDICAL SCIENCES
LITTLE ROCK
(AFOSR-TR-90-0684)
F AD-A224 022

*AFOSR-89-0345
MASSACHUSETTS INST OF TECH
CAMBRIDGE
(AFOSR-TR-90-1137)
A AD-A229 163

*AFOSR-89-0356
NORTHWESTERN UNIV EVANSTON IL
0650-520-H407
(AFOSR-TR-90-1170)
F AD-A230 097

*AFOSR-89-0358
AMERICAN MATHEMATICAL SOCIETY
PROVIDENCE RI
(AFOSR-TR-90-0867)
F AD-A226 141

*AFOSR-89-0360
MATERIALS RESEARCH SOCIETY
PITTSBURGH PA
(AFOSR-TR-90-1057)
F AD-A229 587

*AFOSR-89-0361
MISSISSIPPI STATE UNIV MISSISSIPPI
STATE DEPT OF BIOLOGICAL
SCIENCES
(AFOSR-TR-90-0940)
F AD-A226 849

*AFOSR-89-0362
YALE UNIV NEW HAVEN CT
(AFOSR-TR-90-0774)
A AD-A224 381

*AFOSR-89-0365
TORONTO UNIV (ONTARIO) DEPT OF
CHEMICAL ENGINEERING AND APPLIED
CHEMISTRY
(AFOSR-TR-90-1040)
A AD-A226 792

*AFOSR-89-0367
WISCONSIN UNIV-MADISON DEPT OF
PSYCHOLOGY
(AFOSR-TR-90-1083)
A AD-A229 051

*AFOSR-89-0368
ILLINOIS UNIV AT URBANA
(AFOSR-TR-90-0724)
AD-A223 454
ILLINOIS UNIV AT URBANA DEPT OF
CHEMISTRY
(AFOSR-TR-90-0725)
AD-A223 649
(AFOSR-TR-90-0726)
AD-A223 653

*AFOSR-89-0377
EYE RESEARCH INST OF RETINA
FOUNDATION BOSTON MA
(AFOSR-TR-90-0810)
A AD-A225 357

*AFOSR-89-0383
CALIFORNIA UNIV IRVINE CENTER FOR
THE NEUROBIOLOGY OF LEARNING AND
MEMORY
(AFOSR-TR-90-1217)
A AD-A230 617

*AFOSR-89-0388
MATERIALS RESEARCH SOCIETY
PITTSBURGH PA
(AFOSR-TR-90-1053)
F AD-A229 585
(AFOSR-TR-90-1060)
F AD-A229 586

*AFOSR-89-0389
CHICAGO UNIV IL DEPT OF
PSYCHOLOGY
(AFOSR-TR-90-0894)
F AD-A225 998

*AFOSR-89-0392
CALIFORNIA UNIV DAVIS
(AFOSR-TR-90-0685)
A AD-A224 327

*AFOSR-89-0407
GEORGIA INST OF TECH ATLANTA
(AFOSR-TR-90-1089)
F AD-A228 952

*AFOSR-89-0416
MISSOURI UNIV-ST LOUIS
(AFOSR-TR-90-0938)
A AD-A226 739

*AFOSR-89-0418
ARKANSAS UNIV FOR MEDICAL SCIENCES
LITTLE ROCK
(AFOSR-TR-90-1185)
A AD-A230 299

*AFOSR-89-0424
CALIFORNIA UNIV BERKELEY DEPT OF
INDUSTRIAL ENGINEERING AND
OPERATIONS RESEAR CH
(AFOSR-TR-90-1195)
F AD-A230 227

*AFOSR89-0428
NEW YORK STATE COLL OF CERAMICS
ALFRED
(AFOSR-TR-89-1126)
F AD-A229 206

*AFOSR-89-0429
NEW YORK UNIV NY CENTER FOR
NEURAL SCIENCE
(AFOSR-TR-90-1177)
AD-A230 448

*AFOSR-89-0431
EMORY UNIV ATLANTA GA
(AFOSR-TR-90-1082)
F AD-A229 125

*AFOSR-89-0432
CALIFORNIA UNIV SAN DIEGO LA
JOLLA
(AFOSR-TR-90-1224)

A AD-A230 542

*AFOSR-89-0437
DARTMOUTH MEDICAL SCHOOL HANOVER NH
(AFOSR-TR-90-1132)
A AD-A229 111

*AFOSR-89-0439
RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMISTRY
(AFOSR-TR-90-0958)
AD-A226 837

*AFOSR-89-0447
ILLINOIS UNIV AT URBANA DEPT OF PSYCHOLOGY
(AFOSR-TR-90-0775)
A AD-A224 421
(AFOSR-TR-90-1099)
AD-A228 753
(AFOSR-TR-90-1192)
AD-A230 192

*AFOSR-89-0453
POLYTECHNIC UNIV FARMINGDALE NY WEBER RESEARCH INST
(AFOSR-TR-90-1187)
F AD-A229 961

*AFOSR-89-0456
CALIFORNIA UNIV SAN DIEGO LA JOLLA
(AFOSR-TR-90-0876)
F AD-A226 331

*AFOSR-89-0461
HARVARD UNIV CAMBRIDGE MA DEPT OF PSYCHOLOGY
(AFOSR-TR-90-0943)
A AD-A226 958

*AFOSR-89-0474
TECHNION RESEARCH AND DEVELOPMENT FOUNDATION LTD HAIFA (ISRAEL)
(AFOSR-TR-90-1047)
A AD-A227 371

*AFOSR-89-0491
MASSACHUSETTS INST OF TECH CAMBRIDGE
(AFOSR-TR-90-1142)
AD-A228 763
(AFOSR-TR-90-1115)
A AD-A229 079

*AFOSR-89-0499
SRI INTERNATIONAL MENLO PARK CA
(AFOSR-TR-90-0644)
F AD-A222 881

*AFOSR-89-0509
UTAH STATE UNIV LOGAN
(AFOSR-TR-90-1100)
A AD-A229 032

*AFOSR-89-0515
GEORGIA UNIV RESEARCH FOUNDATION INC ATHENS
(AFOSR-TR-90-1147)
A AD-A229 005
(AFOSR-TR-90-1147)
A AD-A229 124

*AFOSR-89-0516
MICHIGAN UNIV ANN ARBOR
(AFOSR-TR-90-0959)
A AD-A226 827

*AFOSR-89-0531
EAST CAROLINA UNIV SCHOOL OF MEDICINE GREENVILLE NC
(AFOSR-TR-90-1098)
A AD-A229 105

*AFOSR-89-0550
CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL ENGINEERING AND MATE RIALS SCIENCE
(AFOSR-TR-90-1222)
A AD-A230 550

*AFOSR-90-0007
ILLINOIS UNIV CHAMPAIGN
CPL-90-2
(AFOSR-TR-90-1081)
F AD-A228 945

*AFOSR-90-0029
COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY
(AFOSR-TR-90-0723)
AD-A223 650

*AFOSR-90-0049
COLUMBIA UNIV NEW YORK
(AFOSR-TR-90-0962)
AD-A226 840

*AFOSR-90-0054
ROCHESTER UNIV NY DEPT OF CHEMISTRY
(AFOSR-TR-90-0977)
AD-A226 863

*AFOSR-90-0070
TEXAS UNIV AT AUSTIN
UTSMRDL-TR-9001
(AFOSR-TR-90-1180)
A AD-A230 202

*AFOSR-90-0081
MATERIALS RESEARCH SOCIETY PITTSBURGH PA
(AFOSR-TR-90-1058)
F AD-A229 588
(AFOSR-TR-90-1052)
F AD-A229 589
(AFOSR-TR-90-1059)
F AD-A229 590

*AFOSR-90-0085
MASSACHUSETTS INST OF TECH CAMBRIDGE
(AFOSR-TR-90-1110)
AD-A228 762
(AFOSR-TR-90-1109)
AD-A228 765
(AFOSR-TR-90-1108)
AD-A228 766

*AFOSR-90-0089
MATERIALS RESEARCH SOCIETY PITTSBURGH PA
(AFOSR-TR-90-1054)
F AD-A229 199

*AFOSR-90-0143
VIRGINIA UNIV CHARLOTTESVILLE DEPT OF MATERIALS SCIENCE
UVA/525723/MS90
(AFOSR-TR-90-1223)

A AD-A230 541

*AFOSR-90-0165
TEXAS CHRISTIAN UNIV FORT WORTH
DEPT OF PHYSICS
(AFOSR-TR-90-0995)
AD-A226 916
(AFOSR-TR-90-0996)
AD-A226 917
(AFOSR-TR-90-1092)
AD-A228 925

*AFOSR-90-0176
COLORADO UNIV AT BOULDER DEPT OF
ELECTRICAL AND COMPUTER
ENGINEERING
(AFOSR-TR-90-1150)
F AD-A229 083

*AFOSR90-0177
MASSACHUSETTS INST OF TECH
CAMBRIDGE DEPT OF BRAIN AND
COGNITIVE SCIENCES
(AFOSR-TR-90-1127)
F AD-A229 401

*AFOSR-90-0190
INDIANA UNIV-PURDUE UNIV AT
INDIANAPOLIS DEPT OF PSYCHOLOGY
(AFOSR-TR-90-1198)
F AD-A230 506

*AFOSR-90-0252
GEORGE WASHINGTON UNIV HAMPTON VA
JOINT INST FOR ADVANCEMENT OF
FLIGHT SCIENC ES
(AFOSR-TR-90-1225)
F AD-A231 153

*AFOSR-90-0254
STANFORD UNIV CA
(AFOSR-TR-90-1200)
F AD-A230 176

*AFOSR-90-00895
MATERIALS RESEARCH SOCIETY
PITTSBURGH PA
(AFOSR-TR-90-0884)
AD-A226 177

*AFSR-88-0132
NORTH TEXAS STATE UNIV DENTON
DEPT OF CHEMISTRY
(AFOSR-TR-90-0892)
AD-A225 915

*ARPA ORDER-5396
SRI INTERNATIONAL MENLO PARK CA
(AFOSR-TR-90-0815)
AD-A224 565

*ARPA ORDER-5794
HONEYWELL SYSTEMS AND RESEARCH
CENTER BLOOMINGTON MN
(AFOSR-TR-90-0744)
F AD-A224 284

*DAAG29-85-K-0083
STATE UNIV OF NEW YORK AT BUFFALO
DEPT OF BIOCHEMICAL PHARMACOLOGY
(AFOSR-22583.15-LS)
F AD-A224 981

*DAAL03-86-K-0171
BROWN UNIV PROVIDENCE RI
LEFSCHETZ CENTER FOR DYNAMICAL
SYSTEMS
LCDS-90-6
(AFOSR-TR-90-1136)
AD-A228 946

*DAAL03-89-D-0003
NORTH CAROLINA STATE UNIV AT
RALEIGH
(AFOSR-TR90-1219)
AD-A231 307

*DARPA ORDER-6485
CALIFORNIA INST OF TECH PASADENA
(AFOSR-TR-90-1068)
F AD-A228 841

*F19628-86-K-0005
MASSACHUSETTS INST OF TECH
CAMBRIDGE CENTER FOR SPACE
RESEARCH
(AFOSR-TR-90-1063)
AD-A228 838

*F19628-88-K-0008
MASSACHUSETTS INST OF TECH
CAMBRIDGE CENTER FOR SPACE
RESEARCH
(AFOSR-TR-90-1063)
AD-A228 838

*F49620-80-C-0001
MARYLAND UNIV COLLEGE PARK DEPT
OF COMPUTER SCIENCE
CS-TR-1575
(AFOSR-TR-90-0933)
AD-A226 830

*F49620-82-C-0009
NORTH CAROLINA UNIV AT CHAPEL HILL
DEPT OF STATISTICS
(AFOSR-TR-90-0934)
AD-A226 783

*F49620-82-C-0014
STANFORD UNIV CA DEPT OF APPLIED
PHYSICS
(AFOSR-TR-90-0802)
AD-A224 380

*F49620-82-C-0092
STANFORD UNIV CA
(AFOSR-TR-90-0790)
AD-A224 570

*F49620-83-C-0014
STANFORD UNIV CA DEPT OF APPLIED
PHYSICS
(AFOSR-TR-90-0736)
AD-A223 576

*F49620-84-C-0068
STD RESEARCH CORP ARCADIA CA
(AFOSR-TR-90-0860)
F AD-A226 250

*F49620-85-C-0042
ULTRASYSTEMS DEFENSE INC IRVINE
CA
SN-3503-F
(AFOSR-TR-90-0917)
F AD-A226 988

*F49620-85-C-0103
SRI INTERNATIONAL MENLO PARK CA
(AFOSR-TR-90-0815)
AD-A224 565

*F49620-85-C-0142
CLARKSON UNIV POTSDAM NY DEPT OF CHEMISTRY
(AFOSR-TR-90-0546)
AD-A222 553

*F49620-85-C-0144
NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES
TR-291
(AFOSR-TR-90-0646)
AD-A222 344
TR-170
(AFOSR-TR-90-0656)
AD-A222 379
TR-243
(AFOSR-TR-90-0655)
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TR-285
(AFOSR-TR-90-0651)
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TR-178
(AFOSR-TR-90-0652)
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TR-203
(AFOSR-TR-90-0654)
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TR-292
(AFOSR-TR-90-0698)
AD-A223 472
TR-286
(AFOSR-TR-90-0650)
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TR-298
(AFOSR-TR-90-0804)
AD-A224 431
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(AFOSR-TR-90-0780)
AD-A225 595
TR-299
(AFOSR-TR-90-0854)
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TR-296
(AFOSR-TR-90-0853)
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TR-300
(AFOSR-TR-90-0855)
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TR-301
(AFOSR-TR-90-0847)
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TR-302
(AFOSR-TR-90-0848)
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TR-293
(AFOSR-TR-90-0852)
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(AFOSR-TR-90-0846)
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TR-304
(AFOSR-TR-90-0849)
AD-A225 991
TR-264
(AFOSR-TR-90-0845)
AD-A225 992
TR-207
(AFOSR-TR-90-0850)
AD-A226 236
(AFOSR-TR-90-0856)
AD-A226 257

*F49620-85-K-0019
RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMISTRY
(AFOSR-TR-90-1023)
AD-A226 865
(AFOSR-TR-90-1024)
AD-A226 866

*F49620-86-C-0003
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY
(AFOSR-TR-90-0746)
AD-A224 357

*F49620-86-C-0010
WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY
(AFOSR-TR-90-0803)
AD-A224 575

*F49620-86-C-0032
AKRON UNIV OH INST OF POLYMER SCIENCE
(AFOSR-TR-90-0689)
AD-A223 318
(AFOSR-TR-90-0690)
AD-A223 372
(AFOSR-TR-90-0691)
AD-A223 458
(AFOSR-TR-90-0697)
AD-A223 768

*F49620-86-C-0035
RMA AEROSPACE INC MOUNTAIN VIEW CA
RMA-TR-0103
(AFOSR-TR-90-0534)
F AD-A222 612

*F49620-86-C-0037
BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS
(AFOSR-TR-88-0372)
AD-A225 502

*F49620-86-C-0040
BOSTON UNIV MA COLL OF ENGINEERING
(AFOSR-TR-90-0747)
F AD-A224 126

*F49620-86-C-0058
ROCKWELL INTERNATIONAL THOUSAND OAKS CA
SC5459.FR
(AFOSR-TR-90-0745)
F AD-A224 285

*F49620-86-C-0061
PHYSICAL SCIENCES INC ANDOVER MA
PSI-1006/TR-855
(AFOSR-TR-90-0913)
AD-A226 768

*F49620-86-C-0079
WAYNE STATE UNIV DETROIT MI
(AFOSR-TR-90-0528)
F AD-A222 340

*F49620-86-C-0082
HONEYWELL INC BLOOMINGTON MN PHYSICAL SCIENCES CENTER
(AFOSR-TR-90-0930)
AD-A227 045
HONEYWELL SYSTEMS AND RESEARCH CENTER BLOOMINGTON MN
(AFOSR-TR-90-0744)
F AD-A224 284

*F49620-86-C-0108
MCDONNELL DOUGLAS RESEARCH LABS ST

LOUIS MO
MD-QA052
(AFOSR-TR-90-0547)
F AD-A222 853

*F49620-86-C-0111
BROWN UNIV PROVIDENCE RI DIV OF APPLIED MATHEMATICS
(AFOSR-TR-90-0927)
F AD-A227 306

*F49620-86-C-0117
R AND D ASSOCIATES ALEXANDRIA VA
(AFOSR-TR-90-0926)
F AD-A227 305

*F49620-86-C-0127
UNIVERSAL ENERGY SYSTEMS INC DAYTON OH
(AFOSR-TR-90-0693)
A AD-A223 656
(AFOSR-TR-90-0694)
A AD-A223 657
(AFOSR-TR-90-0695-APP
A AD-A223 720
(AFOSR-TR-90-0695-APP
A AD-A223 721
(AFOSR-TR-90-0695-APP
A AD-A223 722

*F49620-86-C-0128
MASSACHUSETTS INST OF TECH CAMBRIDGE
(AFOSR-TR-90-1062)
AD-A228 760
(AFOSR-TR-90-1067)
AD-A228 764
(AFOSR-TR-90-1085)
AD-A228 767
(AFOSR-TR-90-1084)
AD-A228 768

*F49620-86-C-0131
NEW YORK UNIV NY NEUROMAGNETISM LAB
(AFOSR-TR-90-0918)
F AD-A226 668

*F49620-86-K-0012
SRI INTERNATIONAL MENLO PARK CA
(AFOSR-TR-90-0842)
F AD-A225 967

*F49620-86-K-0016
TEXAS A AND M UNIV COLLEGE STATION CENTER FOR MECHANICS OF COMPOSITES
CMC-5485-90-1
(AFOSR-TR-90-0922)
F AD-A226 671

*F49620-87-C-0013
NORTHEASTERN UNIV BOSTON MA
(AFOSR-TR-90-1191)
A AD-A230 168
(AFOSR-TR-90-1190)
F AD-A230 271

*F49620-87-C-0016
ROCHESTER UNIV NY LAB FOR LASER ENERGETICS
(AFOSR-TR-90-0916)
F AD-A226 669

*F49620-87-C-0017
CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL ENGINEERING AND MATE RIALS SCIENCE
(AFOSR-TR-90-1168)
F AD-A230 024

*F49620-87-C-0026
SCIENTIFIC SYSTEMS INC WOBURN MA
(AFOSR-TR-90-0289)
F AD-A222 337

*F49620-87-C-0030
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AD-A230409 REPORT DATE: DEC 90 ANNUAL REPORT

Supervisory Control of Discrete Event Systems: Supremal Controllable and Observable Languages,
AD-A223463 REPORT DATE: SEP 89 FINAL REPORT

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AD-A222881 REPORT DATE: 07 MAY 90 FINAL REPORT

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AD-A223462 REPORT DATE: 89 FINAL REPORT

Surface Chemistry and Structural Effects in the Stress Corrosion of Glass and Ceramic Materials.
AD-A223305 REPORT DATE: MAY 90 FINAL REPORT

Surface-Catalyzed Chemiluminescence.
AD-A230176 REPORT DATE: 10 DEC 90 FINAL REPORT

Symposium on Metals in Biochemistry and Materials Science.
AD-A225481 REPORT DATE: JUN 89 FINAL REPORT

Synaptic Plasticity and Memory Formation.
AD-A230617 REPORT DATE: 05 DEC 90 ANNUAL REPORT

Synthesis and Reactions of Meso- and dl-D(3)-Trishomocubylidene-D(3)-Trishomocubane,
AD-A225912 REPORT DATE: 90 FINAL REPORT

A Synthesis for SF(5) Substituted Fluorocarbon Polymers,
AD-A228879 REPORT DATE: 90 FINAL REPORT

Synthesis of Energetic Acid Labile LOVA Binders.
AD-A225967 REPORT DATE: 08 AUG 90 FINAL REPORT

The Synthesis of Intelligent Real-Time Systems.
AD-A230751 REPORT DATE: 09 NOV 90 FINAL REPORT

Synthesis of Tris(Trifluoromethyl)Gallium and Its Adducts.
AD-A229072 REPORT DATE: 90 ANNUAL REPORT

Synthesis of Vanadium Niobium, and Tantalum Silylimido Complexes and Reactivity of Their Nitrogen-Silicon Bonds.
AD-A225903 REPORT DATE: 90 FINAL REPORT

Systems Reliability and Inference. Summary of Accomplishments 1988-1990.
AD-A224433 REPORT DATE: 30 SEP 89 FINAL REPORT

Tail and Quantile Estimation for Strongly Mixing Stationary Sequences.
AD-A223472 REPORT DATE: APR 90 FINAL REPORT

Tailored Interfaces for Metal-Matrix Composites-Fundamental Considerations.
AD-A229143 REPORT DATE: 31 OCT 90 ANNUAL REPORT

Technology Issues in Free-Space Optical Processing.
AD-A226831 REPORT DATE: 14 OCT 89 FINAL REPORT

Temperature Dependence of the Collisional Quenching of NH(a 1(Delta)) by N2, O2, CO and Xe.
AD-A223652 REPORT DATE: 90 ANNUAL REPORT

Testing and Data Acquisition/Control Equipment for Soil Dynamics and Geotechnical Centrifuge Laboratory.
AD-A223514 REPORT DATE: 29 MAY 90 FINAL REPORT

Theoretical and Experimental Research Into Biological Mechanisms Underlying Learning and Memory.
AD-A223615 REPORT DATE: 24 APR 90 FINAL REPORT

Theoretical Investigations of Negative Ions in a Hydrogen Source.
AD-A229486 REPORT DATE: 31 AUG 90 FINAL REPORT

Theory of Multicenter Partitioning of Molecular Energies.
AD-A226835 REPORT DATE: 01 JUN 90 FINAL REPORT

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AD-A222554 REPORT DATE: 01 JAN 90 FINAL REPORT

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AD-A223576 REPORT DATE: AUG 85 FINAL REPORT

Three-Dimensional Structure of Boundary Layers in Transition to Turbulence.
AD-A223242 REPORT DATE: MAR 89 FINAL REPORT

Time-Resolved Diode Laser Absorption Spectroscopy of CF2 Produced in UV Photodissociation of C2F4 and Measurement of Upsilon3 Absorption Band Strength.
AD-A224357 REPORT DATE: 27 APR 90 FINAL REPORT

Time-Reversion of a Hybrid State Stochastic Difference System with a Jump-Linear Smoothing Application.
AD-A230193 REPORT DATE: JUL 90 ANNUAL REPORT

A Toluene Model for Hydrocarbon Risk Assessment.
AD-A225358 REPORT DATE: 29 MAY 90 FINAL REPORT

Towards an Integration of the Non-Invasive Methodologies of Cognitive Neuroscience: The Eleventh Carmel Workshop.
AD-A228945 REPORT DATE: 18 SEP 90 FINAL REPORT

Toxicology of Perfluorodecanoic Acid.
AD-A230280 REPORT DATE: 01 NOV 90 FINAL REPORT

The Transducer Characteristic of Hair Cells in the Human Ear: A Possible Objective Measure.
AD-A223540 REPORT DATE: 88 FINAL REPORT

Transformation and Precipitation of Toxic Metals by Pseudomonas maltophilia.
AD-A224329 REPORT DATE: 31 MAY 90 ANNUAL REPORT

Transformation Toughening of Composite Ceramics.
AD-A229933 REPORT DATE: 29 OCT 90 ANNUAL REPORT

Transport in Dump Combustors.
AD-A224790 REPORT DATE: 20 AUG 86 FINAL REPORT

Trapezoidal Monte Carlo Integration.
AD-A222380 REPORT DATE: FEB 90 FINAL REPORT

Trapezoidal Stratified Monte Carlo Integration.
AD-A223565 REPORT DATE: MAR 90 FINAL REPORT

Trimmed Sums of Mixing Triangular Arrays with Stationary Rows.
AD-A226257 REPORT DATE: MAR 90 FINAL REPORT

Turbulent Mixing in Exponential Transverse Jets.
AD-A229435 REPORT DATE: 31 SEP 90 FINAL REPORT

Two-Dimensional Electrophoretic Analysis of Subcellular Liver Fractions and Isolated Hepatocytes from Normal and PFDA Treated Rats.
AD-A224766 REPORT DATE: 28 MAY 90 FINAL REPORT

Ultra High Speed Compound Semiconductors and Real Time Signal Processing.
AD-A226790 REPORT DATE: 30 JUN 90 FINAL REPORT

Ultra Low Thermal Expansion Ceramics.
AD-A224571 REPORT DATE: JUL 86 ANNUAL REPORT

Ultrafast Optical Electronics Center.
AD-A226669 REPORT DATE: 28 AUG 90 FINAL REPORT

Ultrafast Physics in Microstructure and Alloy Systems.
AD-A224762 REPORT DATE: 29 JUN 90 FINAL REPORT

Ultrastructure Processing of Macromolecular Materials.
AD-A230175 REPORT DATE: NOV 90 FINAL REPORT

Understanding the High Temperature Behavior of Niobium Aluminides; First Year Summary Report.
AD-A230202 REPORT DATE: 08 NOV 90 ANNUAL REPORT

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AD-A223281 REPORT DATE: DEC 88 ANNUAL REPORT

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AD-A223282 REPORT DATE: DEC 89 ANNUAL REPORT

United States Air Force High School Apprenticeship Program: 1989 Program Management Report. Volume 3.
AD-A223283 REPORT DATE: DEC 88 ANNUAL REPORT

United States Air Force Research Initiation Program for 1988. Volume 1.
AD-A223123 REPORT DATE: APR 90

United States Air Force Research Initiation Program for 1988. Volume 2.
AD-A223124 REPORT DATE: APR 90

United States Air Force Research Initiation Program for 1988. Volume 3.
AD-A223125 REPORT DATE: APR 90

United States Air Force Research Initiation Program for 1988. Volume 4.
AD-A223126 REPORT DATE: APR 90

Unstable Phenomena in Mechanical Systems.
AD-A223640 REPORT DATE: MAY 90 FINAL REPORT

Unsteady Separation over Maneuvering Bodies.
AD-A226829 REPORT DATE: 15 AUG 90 FINAL REPORT

Use of an Indefinite Inner Product for Computing Damped Natural Modes.
AD-A223636 REPORT DATE: 30 SEP 89 FINAL REPORT

Use of D2 to Elucidate OMvPE Growth Mechanisms.
AD-A226966 REPORT DATE: 11 JUL 90 FINAL REPORT

Use of Parametric Models in Designing Polymeric Materials to Specifications,
AD-A223318 REPORT DATE: 89 ANNUAL REPORT

Uses of Tyrosine in Foods to Amplify Catecholamine Release.
AD-A229126 REPORT DATE: 01 NOV 90 FINAL REPORT

Using Memory to Estimate Dates and Locations.
AD-A226848 REPORT DATE: 15 AUG 90 FINAL REPORT

The Variational Principle for Optimal Control of Diffusions with Partial Information,
AD-A222383 REPORT DATE: 89 FINAL REPORT

Viscoelasticity and Tearing Energy of Fluorinated Hydrocarbon Elastomers,
AD-A223768 REPORT DATE: OCT 83 FINAL REPORT

Visual Field Defects for Unidirectional and Oscillatory Motion in Depth,
AD-A223464 REPORT DATE: 89 FINAL REPORT

Visual Information-Processing in the Perception of Features and Objects.
AD-A230488 REPORT DATE: 10 DEC 90 FINAL REPORT

Visual Processing in Texture Segregation.
AD-A230489 REPORT DATE: 18 DEC 90 ANNUAL REPORT

Vortex Simulation of Turbulent Combustion.
AD-A229079 REPORT DATE: 01 OCT 90 ANNUAL REPORT

Workshop on Optical Neural Networks Held in Jackson, Wyoming on 7-10 February 1990.
AD-A229083 REPORT DATE: 28 SEP 90 FINAL REPORT

Workshop on the Chemical Processing of Structural Ceramics for Use in Severe Environments Held in Dayton, Ohio on 16-18 July 1984,
AD-A224410 REPORT DATE: 18 JUL 84 ANNUAL REPORT

Workshop on the Transition from Speech Sounds to Spoken Words.
AD-A225998 REPORT DATE: 06 JUL 90 FINAL REPORT

Xenobiotic Kinetics and Toxicity among Fish and Mammals.
AD-A229065 REPORT DATE: 19 SEP 90 FINAL REPORT

An X-Ray Diffraction System for Evaluating the Epitaxial Growth of III-V Alloy Semiconductors.
AD-A224904 REPORT DATE: 30 SEP 84 FINAL REPORT

X-Ray Optics Research.
AD-A228940 REPORT DATE: 20 SEP 90 FINAL REPORT

1. Novel Dopants in Silica Based Fibers. 2. Applications of Embedded Optical Fiber Sensors in Reinforced Concrete Buildings and Structures.
AD-A224467 REPORT DATE: 20 MAY 90 FINAL REPORT

2-D Velocity Measurements in Supersonic Flow Using Pulsed Planar Laser-Induced Fluorescence,
AD-A226994 REPORT DATE: 89 FINAL REPORT

2,3,7,8-Tetrachlorodibenzo-p-dioxin Pretreatment of Female Mice Altered Tissue Distribution but not Hepatic Metabolism of a Subsequent Dose,
AD-A223537 REPORT DATE: 90 FINAL REPORT

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A231 307 12/1

NORTH CAROLINA STATE UNIV AT RALEIGH

(U) Descriptor Systems in the 90's,

DEC 90 8P

PERSONAL AUTHORS: Campbell, Stephen L.

CONTRACT NO. DAAL03-89-D-0003, $AFOSR-87-0051

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR90-1219, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Conference on Decision and Control 29th, p442-447 Dec 90.

ABSTRACT: (U) After briefly summarizing the growth in the theory of descriptor, or differential algebraic equations (DAEs), over the last two decades, the current challenges and potential successes are discussed.

DESCRIPTORS: (U) , ALGEBRA, DIFFERENTIAL EQUATIONS.

IDENTIFIERS: (U) *Differential equations, Algebra, Reprints, PE61102F, WUAFOSR2304A1.

AD-A231 155 20/6

COLUMBIA UNIV NEW YORK DEPT OF ELECTRICAL ENGINEERING

(U) Losses of Tapered Dielectric Slab Waveguides with Axial Variations in Index of Refraction,

FEB 90 9P

PERSONAL AUTHORS: Scarmozzino, Robert; Podlesnik, Dragan V.; Osgood, Richard M., Jr

CONTRACT NO. F49620-88-C-0088

PROJECT NO. 6321

TASK NO. 05

MONITOR: AFOSR, XF
TR-90-1210, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Microwave Theory and Techniques, v38 n2 p140-147 Feb 90.

ABSTRACT: (U) The effects of varying the index of refraction in the cladding along the length of a tapered dielectric waveguide are calculated using a local normal mode analysis. It is found that in some cases the losses can be reduced by an order of the guide dimensions.

DESCRIPTORS: (U) , CLADDING, DIELECTRIC WAVEGUIDES, DIELECTRICS, REFRACTIVE INDEX, TAPER, WAVEGUIDES.

IDENTIFIERS: (U) *Slab waveguides, *Tapered waveguides, Dielectric waveguides, Refractive index, Insertion losses, Mode analysis, Short tapers, Reprints, PE62712E, WUAFOSR632105

ABSTRACTS

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A231 307 12/1

NORTH CAROLINA STATE UNIV AT RALEIGH

(U) Descriptor Systems in the 90's.

DEC 90 8P

PERSONAL AUTHORS: Campbell, Stephen L.

CONTRACT NO. DAAL03-89-D-0003, $AFOSR-87-0051

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR90-1219, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Conference on Decision and Control 29th, p442-447 Dec 90.

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DESCRIPTORS: (U) , ALGEBRA, DIFFERENTIAL EQUATIONS.

IDENTIFIERS: (U) *Differential equations, Algebra, Reprints, PE61102F, WUAFOSR2304A1.

AD-A231 155 20/6

COLUMBIA UNIV NEW YORK DEPT OF ELECTRICAL ENGINEERING

(U) Losses of Tapered Dielectric Slab Waveguides with Axial Variations in Index of Refraction.

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MONITOR: AFOSR, XF
TR-90-1210, AFOSR

UNCLASSIFIED REPORT

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DESCRIPTORS: (U) , CLADDING, DIELECTRIC WAVEGUIDES, DIELECTRICS, REFRACTIVE INDEX, TAPER, WAVEGUIDES.

IDENTIFIERS: (U) *Slab waveguides, *Tapered waveguides, Dielectric waveguides, Refractive index, Insertion losses, Mode analysis, Short tapers, Reprints, PE62712E, WUAFOSR632105

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A231 153 9/1

GEORGE WASHINGTON UNIV HAMPTON VA JOINT INST FOR ADVANCEMENT OF FLIGHT SCIENC ES

(U) Effective Computational Strategy for Predicting the Response of Complex Systems.

DESCRIPTIVE NOTE: Final rept. 1 Mar-31 Aug 90,

OCT 90 60P

PERSONAL AUTHORS: Noor, Ahmed K.

CONTRACT NO. AFOSR-90-0252

PROJECT NO. 2302

MONITOR: AFOSR, XF
TR-90-1225, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) An effective computational strategy is developed for generating the response of complex systems using (small or large) perturbations from the response of a simple structure (or a simpler mathematical/discrete model of the original structure). Two general approaches are developed for selecting the simpler model and establishing the relations between the original and simpler models. The two approaches are: decomposition or partitioning strategy, and hierarchical modeling strategy. Two effective partitioning strategies are used. The first is based on uncoupling of load-carrying mechanisms, and the second is based on symmetry transformations. The hierarchical modeling used is the predictor-corrector iterational process based on using a simple mathematical model in the predictor phase and correcting the response using a more accurate mathematical model.

DESCRIPTORS: (U) , ACCURACY, COMPUTATIONS, DECOMPOSITION, HIERARCHIES, LOADS(FORCES), MATHEMATICAL MODELS, MODELS, PERTURBATIONS, PREDICTIONS, RESPONSE, STRATEGY, SYMMETRY.

IDENTIFIERS: (U) *Computations, *Systems analysis, *Response, *Predications, PE61102F.

AD-A231 110 12/4

WASHINGTON STATE UNIV PULLMAN

(U) Rapidly Convergent Algorithms for Nonsmooth Optimization.

DESCRIPTIVE NOTE: Final rept. 16 Jun 88-30 Sep 90,

DEC 90 6P

PERSONAL AUTHORS: Mifflin, Robert

CONTRACT NO. AFOSR-88-0180

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR, XF
TR-90-1220, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research supported by this grant has continued the development of efficient methods for solving optimization problems involving implicity defined functions that are not everywhere differentiable. Progress has been made on extending a rapidly convergent algorithm for the single variable case to the n variable case. A specialization of this research has produced a new two matrix quasi-Newton method for smooth minimization. Also, a new fast method has been developed for the single variable case where only function, and not subderivative, values are available.

DESCRIPTORS: (U) , ALGORITHMS, CONVERGENCE, EFFICIENCY, FUNCTIONS, OPTIMIZATION, PROBLEM SOLVING, SPECIALIZATION, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A8, *Algorithms, *Optimization, Mathematical programming.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A231 109 5/8

STANFORD UNIV CA DEPT OF PSYCHOLOGY

(U) Decision under Conflict.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Dec 89-30 Nov 90,

NOV 90 12P

PERSONAL AUTHORS: Tversky, Amos

CONTRACT NO. AFOSR-89-0064

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1216, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The present report summarizes two projects. The first project, which focuses on riskless choice, involves a series of experiments that demonstrate the phenomenon of loss aversion: losses and disadvantages have greater impact on preference than gains and advantages. the evidence shows that choice depends on the status quo or reference level, and that changes of reference point often lead to reversals of preference. To account for these observations, we develop a reference-dependent theory of individual choice, which explains such effects by a deformation of the preference map about the reference point. Implications of loss aversion to both individual and aggregate behavior are explored. The second project, which focuses on decision under uncertainty, extends prospect theory by incorporating a cumulative (i.e., rank-dependent) weighting scheme. In this model, the carriers of value are gains and losses, defined relative to a reference point, and the impact of uncertainty is summarized by different weighting functions for gains or for losses. Two evaluation principles -- diminishing sensitivity and loss aversion -- are invoked to explain the characteristic curvature of the value function and the weighting functions. A review of the experimental evidence and the results of a new experiment reveal a distinctive four-fold pattern of risk attitudes: risk aversion for gains and risk seeking for losses of high probability; risk seeking for gains and

AD-A231 109 CONTINUED

risk aversion for losses of low probability.

DESCRIPTORS: (U) , ATTITUDES(PSYCHOLOGY), BEHAVIOR, DEFORMATION, FUNCTIONS, IMPACT, LOSSES, LOW RATE, PROBABILITY, REVERSIBLE, RISK, TEST AND EVALUATION, UNCERTAINTY, WEIGHTING FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4, *Decision making, *Cognition, *Conflict, Loss aversion, Reference dependence, Decision weights.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 751 12/7

TELEOS RESEARCH PALO ALTO CA

(U) The Synthesis of Intelligent Real-Time Systems.

DESCRIPTIVE NOTE: Final rept. Apr 89-Nov 90,

NOV 90 178P

PERSONAL AUTHORS: Rosenschein, Stanley J.; Kaelbling, Leslie P.

REPORT NO. TR-90-03

CONTRACT NO. F49620-89-C-0055

PROJECT NO. 2304, 2304

TASK NO. A7, A2

MONITOR: AFOSR, XA
TR-90-1193, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Teleos Research, under the sponsorship of the Air Force Office of Scientific Research, has carried out a two-year program of research on The Synthesis of Intelligent Real-Time Systems. The purpose of the effort was to develop and extend theories and techniques that facilitate the design and implementation of intelligent real-time systems. In particular, Teleos has extended situated-automata theory to apply to situations in which the system has probabilistic information about the world; designed and built a high-level, declarative programing tool for synthesizing efficient programs that track dynamic conditions in the world; clarified the theoretical relationships between Gapps, an existing declarative programming tool for describing action strategies, and the newly designed tool; investigated the possibility of moving the burden of developing correct programs from the human programmer to the agent itself through the use of algorithms that allow the agent to learn from trial and error; applied the principles of situated automata theory to the understanding of existing vision algorithms and the development of new ones; and tested these theoretical principles and design tools in a real robotic domain.

AD-A230 751 CONTINUED

DESCRIPTORS: (U) , ALGORITHMS, AUTOMATA, DYNAMICS, EFFICIENCY, PROBABILITY, REAL TIME, ROBOTICS, STRATEGY, SYNTHESIS, THEORY, VISION.

IDENTIFIERS: (U) WUAFOSR2304A2, WUAFOSR2304A7.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 748 20/13 1/1 12/5

APPLIED AND THEORETICAL MECHANICS INC OAKLAND CA

(U) Heat Transfer Predictions of Hypersonic Transitional Flows.

DESCRIPTIVE NOTE: Final rept. 1 Oct 89-31 Oct 90,

NOV 90 45P

PERSONAL AUTHORS: Champney, Joelle M.

REPORT NO. ATM-TR-90-025

CONTRACT NO. F49620-90-C-0004

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1188, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A numerical model to solve transition process observed in hypersonic flows over cones has been developed. Low Reynolds number two-equation turbulence models were employed with a production term modification (PTM) technique. The approach determined the extent of the transition zone. The onset of transition was imposed using experimental measurements when available. when not available, the onset of transition was determined by a stability criterion which is related to the Bushnell-Reshotko transition criterion. The PTM technique was incorporated into a NASA-Ames implicit Reynolds averaged Navier Stokes solver, the TURF code, and tested for transitional hypersonic flows over flat plates. The model parameters were tuned as a function of free stream Mach number. The PTM technique was also tested for transitional hypersonic flows over sharp cones and blunt cones for a variety of flow conditions. Comparisons of computed heat transfer with experimental measurements are shown to be good.

DESCRIPTORS: (U) , BLUNT BODIES, CODING, CONICAL BODIES, EXPERIMENTAL DATA, FLAT PLATE MODELS, FLOW, FREE STREAM, GRASSES, HEAT TRANSFER, HYPERSONIC FLOW, MACH NUMBER, MATHEMATICAL MODELS, MEASUREMENT, MODELS, PARAMETERS,

AD-A230 748 CONTINUED

PREDICTIONS, PRODUCTION, SHARP BODIES, TRANSITIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A1, TURF Computer program, Two equation turbulence models.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 617 6/5

CALIFORNIA UNIV IRVINE CENTER FOR THE NEUROBIOLOGY OF LEARNING AND MEMORY

(U) Synaptic Plasticity and Memory Formation.

DESCRIPTIVE NOTE: Annual technical rept. 15 May 89-14 May 90.

DEC 90 9P

PERSONAL AUTHORS: Lynch, Gary

CONTRACT NO. AFOSR-89-0383

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1217, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies were conducted on the induction, expression, and stabilization of long-term potentiation (LTP), a form of synaptic plasticity that is likely to participate in memory encoding. Induction was shown to involve a glycine receptor site that modulates calcium fluxes through a subclass of transmitter receptors. Other results indicated that LTP expression is not likely to involve release or changes in spine increased resistance, but did provide direct evidence that potentiation reflects a change in the conductance properties of post-synaptic receptors. The hypothesis was developed that stabilization of LTP involves a disconnection and reconnection of adhesive relationships that maintain the organization of the synaptic region. This involves a calcium sensitive protease that cleaves cytoskeletal proteins and the exposure of a group of adhesion receptors known as integrins. Together with results form previous years of support, and from other laboratories, work over the past year has led to a reasonable complete hypothesis concerning how synapses can be rapidly transformed from one stable state to another and thus be used as memory storage devices.

DESCRIPTORS: (U) , ADHESIVES, CALCIUM, CELL STRUCTURE, CODING, CONDUCTIVITY, FIBERS, GLYCINE, HYPOTHESES, LONG

AD-A230 617 CONTINUED

RANGE(TIME), MEMORY DEVICES, PEPTIDE HYDROLASES, PLASTIC PROPERTIES, PROTEINS, REGIONS, SENSE ORGANS, SENSITIVITY, SITES, SPINAL COLUMN, STABILITY, STABILIZATION, STORAGE, SYNAPSE.

IDENTIFIERS: (U) *WUAFOSR2312A2, PE61102F, Memory, Long-term potentiation, Pharmacology.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 550 11/6

CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL ENGINEERING AND MATE RIALS SCIENCE

(U) Fundamental Studies of Beta Phase Decomposition Modes in Titanium Alloys.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 89-30 Sep 90,

NOV 90 59P

PERSONAL AUTHORS: Aaronson, H. I.; Mou, Y.; Hall, M. G.

CONTRACT NO. AFOSR-89-0550

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1222, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Extensive efforts were made during this grant year to prepare generic overviews on major aspects of phase transformations. Topics on which overviews have been completed or are presently in progress as part of this activity include: crystallographic and mechanistic aspects of growth by shear vs. diffusional growth, interphase boundary structures formed during diffusional transformations in Ti-base alloys, a current summary of the technical bases for three different views of what constitutes bainite, a summary of the diffusionist views on the bainite reactions, the role of ledges in vapor-crystal, liquid-crystals and crystal-crystal phase transformations, a critique of Mats Hillerts' approach to the growth kinetics of diffusional transformations, and assessments of published studies on homogeneous nucleation kinetics in binary metallic alloys and atomic mechanism of diffusional nucleation and growth. (js)

DESCRIPTORS: (U) , BAINITE, BINARY ALLOYS, BOUNDARIES, DECOMPOSITION, GROWTH(GENERAL), HOMOGENEITY, KINETICS, NUCLEATION, PHASE STUDIES, PHASE TRANSFORMATIONS, SHEAR PROPERTIES, STRUCTURES, TITANIUM ALLOYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

AD-A230 543 12/1

CALIFORNIA UNIV SANTA BARBARA CENTER FOR COMPUTATIONAL SCIENCES AND ENGINEERI NG

(U) Stability Analysis of Finite Difference Approximations to Hyperbolic Systems, and Problems in Applied and Computational Matrix and Operator Theory.

DESCRIPTIVE NOTE: Final rept. 1 May 88-30 Nov 90,

DEC 90 83P

PERSONAL AUTHORS: Goldberg, Moshe; Marcus, Marvin

CONTRACT NO. AFOSR-88-0175

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1221, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes research in the following areas: Convenient stability criteria for difference approximations to hyperbolic initial-boundary value problems; Multiplicativity and stability of matrix and operator norms; Hadamard Products and Powers; Inequalities for Tensors; Inequalities for Generalized Matrix Functions; Inequalities for Eigenvalues and Singular Values; Distance Matrices; Numerical Range; Determinants of Sums. (KR)

DESCRIPTORS: (U) , APPROXIMATION(MATHEMATICS), BOUNDARY VALUE PROBLEMS, EIGENVALUES, FINITE DIFFERENCE THEORY, HYPERBOLAS, NUMERICAL ANALYSIS, OPERATORS(MATHEMATICS), STABILITY, TENSORS, THEORY, VALUE.

IDENTIFIERS: (U) Stability, Hyperbolic PDE, Norms, Eigenvalues, Singular values, Numerical range, Inequalities, Multidimensional scaling, PE61102F, WU2304A3

AD-A230 542 9/1

CALIFORNIA UNIV SAN DIEGO LA JOLLA

(U) Sources of Anisotropy in Amorphous Magnetic Thin Films.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 89-31 Jul 90,

NOV 90 6P

PERSONAL AUTHORS: Hellman, Frances

CONTRACT NO. AFOSR-89-0432

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR, XF
TR-90-1224, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) With the assistance of this grant, my laboratory has progressed substantially and is now beginning to produce results. This last year, in addition to lab build-up and student supervision, I have continued work on the amorphous rare earth transition metal alloys. There are several significant new results arising from this work. A model for the growth-induced macroscopic magnetic anisotropy: I have clear evidence against Takeshi Egami's Bond-Orientational Anisotropy model which attributes the anisotropy to anelastic strain . He describes this model as a simple increase in the number of bonds in-plane compared to out-of-plane due to stress during the growth. I find a strong (more than an order of magnitude) dependence of the anisotropy on deposition temperature and essentially no dependence on the state of stress either during the growth or after. I believe the reason for the anisotropy is a texturing of the short-range order relative to the surface, which minimizes surface energy at every instant during the growth, and gets frozen into the structure. (JS)

DESCRIPTORS: (U) , ACCUMULATION, ADDITION, AMORPHOUS MATERIALS, ANISOTROPY, DEPOSITION, LABORATORIES, MAGNETIC MATERIALS, SHORT RANGE(DISTANCE), SHORT RANGE(TIME), SOURCES, STRESSES, STUDENTS, SUPERVISION, SURFACE ENERGY, TEMPERATURE, THIN FILMS.

AD-A230 542 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2306C1.

AD-A230 541 11/6

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF MATERIALS SCIENCE

(U) Fundamental Concepts Relating Local Atomic Arrangement Deformation and Fracture of Intermetallic Alloys.

DESCRIPTIVE NOTE: Annual technical rept. 1 Feb 90-1 Jan 91,

DEC 90 10P

PERSONAL AUTHORS: Starke, Edgar A., Jr; Wert, John A.

REPORT NO. UVA/525723/MS90

CONTRACT NO. AFOSR-90-0143

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1223, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research program is to identify relationships between characteristics of intermetallic alloys at an atomic scale, the operation of slip and twinning deformation mechanisms at a microstructural scale, and bulk deformation and fracture properties. Our research focuses on two fundamental aspects of the problem of low toughness of intermetallic alloys: The role of deformation twinning in promoting ductility and toughness of ordered intermetallic alloys, and modeling the effect of dislocation characteristics on crack tip plasticity. (JS)

DESCRIPTORS: (U) , CRACKS, DEFORMATION, DISLOCATIONS, DUCTILITY, FRACTURE(MECHANICS), INTERMETALLIC COMPOUNDS, MICROSTRUCTURE, PLASTIC PROPERTIES, SCALE, TOUGHNESS, TWINNING(CRYSTALLOGRAPHY).

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

AD-A230 539 9/1

COLUMBIA UNIV NEW YORK MICROELECTRONICS SCIENCE LAB

(U) Chemically Modified GaAs Schottky Barrier Variation,

AUG 89 7P

PERSONAL AUTHORS: Schmidt, M. T.; Ma, Q. Y.; Podlesnik, D. V.; Osgood, R. M.; Yang, E. S.

CONTRACT NO. F49620-89-C-0088

PROJECT NO. 6321

TASK NO. 05

MONITOR: AFOSR, XF
TR-90-1206, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Vacuum Science Technology vB7 n4, p980-985, Jul/Aug 89.

ABSTRACT: (U) Chemical modification of GaAs surfaces with and without photoenhancement can produce large variations in the Schottky barriers for metals which are subsequently deposited. Deep ultraviolet light enhanced oxidation of the GaAs surfaces produces barrier variation toward the ideal Schottky limit, however, there is no evidence that the number of interface states is reduced. A calculation suggests that this can be explained by the interface state energy distribution being altered to shift the states toward the band gap edges, possible by a photochemical reaction of oxygen. This allows a wider range of Fermi level movement. Different procedures to introduce oxygen at the metal/GaAs interface without photoenhancement result in different barrier variations. Therefore, altered interface chemistry, as well as the mere presence of a species at the interface, is shown to be important for Schottky barrier formation.

DESCRIPTORS: (U) , BARRIERS, CHEMICAL PROPERTIES, CHEMISTRY, ENERGY, FERMI SURFACES, GALLIUM ARSENIDES, INTERFACES, LIMITATIONS, METALS, MODIFICATION, OXIDATION, OXYGEN, PHOTOCHEMICAL REACTIONS, SCHOTTKY BARRIER DEVICES, SHIFTING, SURFACES, ULTRAVIOLET RADIATION, VARIATIONS.

IDENTIFIERS: (U) Photoenhancement, *Schottky barrier

AD-A230 539 CONTINUED

devices, GaAs Surfaces, *Gallium arsenides, Reprints, Metal insulator semiconductors, PE62712E, WUAFOSR63215.

AD-A230 538 7/5 9/3

COLUMBIA UNIV NEW YORK MICROELECTRONICS SCIENCE LAB

(U) Effect of Carrier Confinement on the Laser-Induced Etching of GaAs/AlGaAs Heterostructure,

SEP 89 4P

PERSONAL AUTHORS: Ruberto, M. N.; Willner, A. E.; Podlesnik, D. V.; Osgood, R. M., Jr.

CONTRACT NO. F49620-89-C-0088

PROJECT NO. 6321

TASK NO. 05

MONITOR: AFOSR, XF
TR-90-1209, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Physics Letters v55 10 p984-986, 4 Sep 89.

ABSTRACT: (U) Laser-induced photochemical etching was used to etch GaAs/AlGaAs multilayered material. In this carrier-driven process, the confinement of photogenerated holes to the alternating GaAs layers resulted in the controlled lateral etching buried GaAs layers. An application of this etching technique to forming microcleaved laser facets is described.

DESCRIPTORS: (U) , CONFINEMENT(GENERAL), ETCHING, GALLIUM ARSENIDES, LASER APPLICATIONS, LASERS, LAYERS, MATERIALS, PHOTOCHEMICAL REACTIONS.

IDENTIFIERS: (U) *Aluminum gallium arsenides, Laser induced etching, Photochemical reactions, Heterostructures, Gallium arsenides, Lasers, Reprints.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 537 20/3 20/14

COLUMBIA UNIV NEW YORK MICROELECTRONICS SCIENCE LAB

(U) Modeling of Riblike Waveguides with Isolation Trenches of Finite Width,

DEC 89 5P

PERSONAL AUTHORS: Scarmozzino, Robert; Podlesnik, Dragan V.; Willner, Alan E.; Osgood, Richard M., Jr

CONTRACT NO. F49620-89-C-0088

PROJECT NO. 6321

TASK NO. 05

MONITOR: AFOSR, XF
TR-90-1208, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Optics v28 n24 p5203-5206, 15 Dec 89.

ABSTRACT: (U) A method for calculating the propagation and loss characteristics of riblike waveguiding structures having isolation trenches of finite width is presented.

DESCRIPTORS: (U) , ISOLATION, LOSSES, REPRINTS, TRENCHES, WIDTH.

IDENTIFIERS: (U) PE62712E, WUAFOSR632105, Waveguides, Riblike, Isolation trenches, Reprints.

AD-A230 536 9/1

COLUMBIA UNIV NEW YORK MICROELECTRONICS SCIENCE LAB

(U) Photoemissive Scanning Microscopy of Doped Regions on Semiconductor Surfaces,

JUL 89 5P

PERSONAL AUTHORS: Quiniou, B.; Scarmozzino, R.; Wu, Z.; Osgood, R. M., Jr

CONTRACT NO. F49620-89-C-0088

PROJECT NO. 6321

TASK NO. 05

MONITOR: AFOSR, XF
TR-90-1207, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Physics Letters v55 n5 p481-483, 31 Jul 89.

ABSTRACT: (U) Photoelectric emission induced by a focused UV laser beam (wavelength = 257 nm) has been used to probe semiconductor surfaces. It was possible to distinguish between regions of different doping levels on a silicon surface. The spatial resolution was found to be limited only by the laser beam spot size. Keywords: Laser, photoelectric, emission, semiconductor. (js)

DESCRIPTORS: (U) , DOPING, FOCUSING, LASER BEAMS, LASER SPOTS, LASERS, LEVEL(QUANTITY), MICROSCOPY, PHOTOELECTRIC EMISSION, PROBES, REGIONS, RESOLUTION, SCANNING, SEMICONDUCTORS, SILICON, SPATIAL DISTRIBUTION, SURFACES, ULTRAVIOLET LASERS.

IDENTIFIERS: (U) PE62712E, WUAFOSR632105.

AD-A230 506 12/1

INDIANA UNIV-PURDUE UNIV AT INDIANAPOLIS DEPT OF PSYCHOLOGY

(U) Evaluation of Bootstrap and Parametric Percentile Contrasts. Volume 1. Splits Analysis: A Method for Noncentral Tendency Comparisons.

DESCRIPTIVE NOTE: Final rept. 1 Mar-31 Dec 90,

OCT 90 14P

PERSONAL AUTHORS: Rasmussen, Jeffrey L.

CONTRACT NO. AFOSR-90-0190

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1198, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In some instances group comparisons in terms of upper or lower portions of the score distributions are more informative than comparisons of central tendency. These comparisons can be done by carrying out a split on the data prior to an analysis of variance (ANOVA). The resulting test statistic from ANOVA is not distributed as an F ration however, and requires evaluation for significance relative to an empirical monte-carlo distribution. An example and computer program are presented.

DESCRIPTORS: (U) , COMPUTER PROGRAMS, DISTRIBUTION, MONTE CARLO METHOD, SPLITTING.

IDENTIFIERS: (U) Percentile contrasts, Statistical inference.

AD-A230 506

AD-A230 489 20/6

OREGON UNIV EUGENE DEPT OF PSYCHOLOGY

(U) Visual Processing in Texture Segregation.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 89-30 Sep 90,

DEC 90 32P

PERSONAL AUTHORS: Beck, Jacob

CONTRACT NO. AFOSR-88-0323

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1213, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments were conducted further investigating the role of both spatial frequency channels and grouping mechanisms in texture segregation. Patterns were constructed in which differences in the outputs of Gabor filters fail to account for the perceived segregation. Perceived segregation is, however, predicted by the outputs of DOG filters. The results suggest that there are at least two primitives for texture segregation: Changes in the orientations of a stimulus in which the slopes of the component features do not change, e.g., a 180 degree rotation of a stimulus, yields stronger segregation with a 3D figure than with a 2D figure. We hypothesize that the segregation differences are due to grouping processes. A 3D representation makes explicit the orientations of object surfaces enabling grouping of 3D figures by the similarity of their surface orientations, e.g., the directions of their surface normals.

DESCRIPTORS: (U) , CHANNELS, DOGS, FILTERS, FREQUENCY, IMAGE PROCESSING, ORIENTATION(DIRECTION), OUTPUT, SEGREGATION(METALLURGY), SPATIAL DISTRIBUTION, SURFACES, TEXTURE, VISUAL PERCEPTION.

IDENTIFIERS: (U) Vision, Texture segregation, Perceptual grouping, Optics, Filters.

AD-A230 489

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 488 20/6 5/8

CALIFORNIA UNIV BERKELEY DEPT OF PSYCHOLOGY

(U) Visual Information-Processing in the Perception of Features and Objects.

DESCRIPTIVE NOTE: Final rept. 1 Jan 87-31 Aug 90,

DEC 90 19P

PERSONAL AUTHORS: Treisman, Anne

CONTRACT NO. AFOSR-87-0125

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1218, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research explored varios aspects of visual processing in the perception of features and objects. Studies of visual features tested the level of abstraction of the coding of orientation, the emergence of features in surface media defined by texture, motion or depth, and the role of similarity in preattentive representation of coarsely coded values. Object perception was explored in a series of studies requiring subjects to conjoin features, and testing the role played by spatially selective attention. The results suggested a modification of feature integration theory, allowing some preattentive control through feature maps. We also found evidence for object-specific tokens in the coding of dynamic displays of moving, changing objects. In studies of perceptual learning, extended practice effects were shown to be very specific to details of the practice situation. Finally, visual memory for arbitrary line patterns showed both surprising plasticity)long-lasting traces after a single presentation of 50 patterns) and surprising dissociations between implicit and explicit tests. (js)

DESCRIPTORS: (U) , ATTENTION, CODING, DISPLAY SYSTEMS, DYNAMICS, INFORMATION PROCESSING, LEARNING, LONG RANGE(TIME), MAPS, MEDIA, MEMORY(PSYCHOLOGY), MODIFICATION, ORIENTATION(DIRECTION), PATTERNS,

AD-A230 488 CONTINUED

PERCEPTION, PLASTIC PROPERTIES, SURFACES, VALUE, VISION.

IDENTIFIERS: (U) Features, Objects, Attention, Vision, WUAFOSR2313A4, PE61102F.

AD-A230 487 12/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Basic Research in Reliability for Real Systems.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 90,

SEP 90 6P

PERSONAL AUTHORS: Li, Victor O.

CONTRACT NO. AFOSR-88-0259

MONITOR: AFOSR, XF
TR-90-1214, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of our research is to develop practical models and efficient algorithms to analyze the reliability/availability/maintainability of complex systems in which component failures are statistically dependent and each component is subject to degradations before complete failure. The Cause-Based Multimode Model (CBMM) was developed. Practical and computationally tractable solution methods were designed. In addition, an ordered enumeration approach was developed to solve the network survivability enhancement problem. Preliminary computational experiments showed that this approach is very efficient.

DESCRIPTORS: (U) , RELIABILITY.

IDENTIFIERS: (U) Reliabilty analysis, Dependent failures, Multimode failures, Ordered enumeration.

AD-A230 486 20/4 12/1

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Basic Research in Reliability for Real Systems.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 90,

SEP 90 6P

PERSONAL AUTHORS: Li, Victor O.

CONTRACT NO. AFOSR-88-0259

MONITOR: AFOSR, XF
TR-90-1214, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper we study the hole pressure problem for plane, steady, creeping shear flows of a Johnson-Segalman model. To correctly apply the theory of Higashitani, Pritchard, Baird & Lodge (HPBL), we start with a modified hole pressure relation (MHPR) and we simulate the hole pressure measurement by FEM and multi-mesh extrapolation techniques. The path integrals of MHPR & HPBL are evaluated and a full instrument simulation is conducted. An encouraging agreement between the simulated hole pressure and the analytical prediction is found, within the computationally-accessible range of De < or - 1, which supports the postulates about the possible error cancellation in MHPR and the validity of HPBL for J-S fluid. This numerical investigation experiment and other numerical work, that N sub 1 can be predicted via the HPBL equations to a sufficient approximation to be of practical use. Keywords: Non-Newtonian flows, Couette flow, Poiseuille flow, Hole pressure, Johnson-Segalman fluid, HPBL equations, Error cancellation, Numerical simulation, Finite element method, Posterior error analysis, Multi-mesh extrapolation.

DESCRIPTORS: (U) , CANCELLATION, COUETTE FLOW, CREEP, EQUATIONS, ERROR ANALYSIS, ERRORS, FINITE ELEMENT ANALYSIS, FLOW, INSTRUMENTATION, INTEGRALS, MATHEMATICAL MODELS, MATHEMATICAL PREDICTION, NONNEWTONIAN FLUIDS, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, PATHS, POISEUILLE FLOW, RELIABILITY, SHEAR PROPERTIES, SIMULATION, STEADY FLOW.

AD-A230 450 11/2 9/3 20/12

GELTECH INC ALACHUA FL

(U) Development of a High Efficiency Q-Switched Glass Laser via Sol-Gel Processing.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 88-30 Sep 90.

OCT 89 93P

PERSONAL AUTHORS: Seth, Vinay K.; Nogues, Jean-Luc; Moreshead, William V.

CONTRACT NO. F49620-89-C-0008

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1201, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Neodymium-doped silica glass is the most desirable glass for Q-switched and amplifier applications due to broad transmission range, a low nonlinear refractive index, low CTE, high lasing efficiency at room temperature, possibility of large size media and possible use of sensitizers to increase energy efficiency. However, preparation of such a glass by conventional melting requires very high temperature resulting in deleterious contamination from the melting crucible. Addition of fluxes to lower the melting temperature however degrades the physical and the optical properties of the glass. Sol-gel technology is a novel way of fabricating glass without melting. This process uses silicon alkoxides for making a sol which is cast into a gel. Heat treatment of this gel at high temperature (still much lower than melting) results in glass. This study explored the fabrication of Nd-doped silica glass by two different sol-gel techniques, namely, mixing and impregnation. The latter process, which requires impregnation of an Nd-containing solution into an ultraporous dehydroxylated silica matrix, was successfully developed. A buffer element, Al, was used to prevent cluster quenching of the fluorescence lifetime of the laser glass. Crack-free monolithic disks of 3.0 weight % Nd2O3 in silica glass

AD-A230 450 CONTINUED

(about 12 mm in diameter and 4 mm in thickness), which had fluorescence lifetimes of about 300 microsec, were fabricated reproducibly. (JHD)

DESCRIPTORS: (U) , ADDITION, AMPLIFICATION, BUFFERS, CLUSTERING, CONTAMINATION, CRUCIBLES, EFFICIENCY, ENERGY, FLUORESCENCE, GELS, GLASS, HEAT TREATMENT, HIGH TEMPERATURE, IMPREGNATION, LASERS, LIFE SPAN(BIOLOGY), MEDIA, MELTING, MELTING POINT, NONLINEAR SYSTEMS, OPTICAL PROPERTIES, QUENCHING, REFRACTIVE INDEX, ROOM TEMPERATURE, SILICA GLASS, SILICON, SIZES(DIMENSIONS), THICKNESS, TRANSMITTANCE.

IDENTIFIERS: (U) Sol gel, Neodymium, Laser glass, Silica, Aluminum, Phosphorus, PE65502F, WUAFOSR3005A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 448 6/4

NEW YORK UNIV NY CENTER FOR NEURAL SCIENCE

(U) Higher Order Mechanisms of Color Vision.

DESCRIPTIVE NOTE: Technical rept. 15 Jun 89-14 Jun 90,

NOV 90 18P

PERSONAL AUTHORS: Krauskopf, John

CONTRACT NO. AFOSR-89-0429

PROJECT NO. 231

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1177, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report covers our activities since June 15, 1989. The main accomplishments have been: (1) Completion and publication of a comprehensive study of the effects of chromatic content, blur and contrast of targets on vernier acuity and on stereo acuity; (2) The use of a new method of measuring chromatic discrimination under conditions of constant adaptation; (3) Continuation of the study of the chromatic properties of single cells in the monkey cortex, extending our experiments to Area V2; (4) Experiments on the significance of color in the perception of motion; (5) Experiments on the effects of chromatic adaptation on color matching; and (6) The effects of noise masks on the detection of chromatic and luminance pulses.

DESCRIPTORS: (U) , ACUITY, ADAPTATION, CELLS, CHROMATICITY, COLOR VISION, COLORS, DETECTION, DISCRIMINATION, LUMINANCE, MASKS, MATCHING, MEASUREMENT, MONKEYS, MOTION, NOISE, PERCEPTION, PULSES.

IDENTIFIERS: (U) *Visual acuity, *Color vision, *Perception, *Luminance, *Psychophysics, *Discrimination, Vision, Color, Thresholds, Isoluminance.

AD-A230 418 12/3 15/5

ARIZONA STATE UNIV TEMPE DEPT OF MATHEMATICS

(U) Reliability Modeling of Repairable Systems in Random Environments Using Multivariate Conditional Failure.

DESCRIPTIVE NOTE: Final rept. 1 Jun 88-31 May 90,

MAY 90 4P

PERSONAL AUTHORS: Shaked, M.

CONTRACT NO. AFOSR-88-0188

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1212, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *MULTIVARIATE ANALYSIS, REPAIR, RANDOM VARIABLES.

IDENTIFIERS: (U) Failure rates, Reliability theory, WUAFOSR2304A5, PE61102F.

AD-A230 417 12/1

MARYLAND UNIV COLLEGE PARK

(U) Applications of Operator Theory to Maximum Entropy Problems.

DESCRIPTIVE NOTE: Final rept. 15 Jun 87-15 Oct 90,

OCT 90 6P

PERSONAL AUTHORS: Ellis, Robert L.; Gohberg, Israel; Lay, David C.

CONTRACT NO. AFOSR-87-0287

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-1211, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project was concerned with problems in operator theory and matrix theory that underlie the maximum entropy principle in signal processing and systems theory. Two papers have been completed that generalize this principle to a wide class of indefinite hermitian matrices. Three new papers give a thorough study of rank-preserving extensions of band matrices. Factorization theorems are obtained for wide classes of Toeplitz and Hankel matrices, and connections are given to the Kalman partial realization problems in signal processing. Applications are also given to signal processing when the power spectrum consists of a set of pure line spectra. In another paper, new work on orthogonal polynomials and the Gohberg-Semencul formula for the inverse of a Toeplitz matrix has been completed. Three new papers generalize for rational matrix functions a number of well-known interpolation problems for scalar functions. A new approach to tangential interpolation problems is presented, and applications are given to sensitivity minimization in control theory.

DESCRIPTORS: (U) , CONTROL THEORY, ENTROPY, INTERPOLATION, LINE SPECTRA, MATRIX THEORY, OPERATORS(MATHEMATICS), ORTHOGONALITY, POLYNOMIALS, POWER SPECTRA, PURITY, SCALAR FUNCTIONS, SIGNAL PROCESSING,

TANGENTS, THEOREMS, THEORY.

IDENTIFIERS: (U) WUAFOSR2304A6, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 415 5/9 12/7

STANFORD UNIV CA DEPT OF PSYCHOLOGY

(U) Acquiring Generalizations to Organize Human Databases.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 87-31 Aug 90,

NOV 90 18P

PERSONAL AUTHORS: Bower, Gordon H.; Clapper, John P.

CONTRACT NO. AFOSR-87-0282

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1175, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes a three-year program of research on category learning in unsupervised environments, and the role of learned categories in the processing and retention of individual instances. A computational model of unsupervised category learning is described, and the model's implications for the evaluation, comparison, and memorization of instances are explored in several experiments. We introduce a new index of unsupervised learning, referred to as attribute listing, and show that such learning tends to optimize the encoding of instance features and their organization in memory. The empirical techniques developed in this project appear to hold considerable promise for further research on conceptual knowledge and its role in cognitive performance.

DESCRIPTORS: (U) , COGNITION, COMPUTATIONS, DATA BASES, HUMANS, INDEXES, LEARNING, MATHEMATICAL MODELS, PERFORMANCE(HUMAN), COGNITION, COMPUTATIONS, DATA BASES, HUMANS, INDEXES, LEARNING, MATHEMATICAL MODELS, PERFORMANCE(HUMAN).

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

AD-A230 410 6/4

DAVID SARNOFF RESEARCH CENTER PRINCETON NJ

(U) Models of the Neuronal Mechanisms of Target Localization of the Barn Owl.

DESCRIPTIVE NOTE: Annual rept. for FY89,

DEC 90 49P

PERSONAL AUTHORS: Pearson, John; Sarnoff, David

CONTRACT NO. F49620-89-C-0131

PROJECT NO. 2313

TASK NO. A9

MONITOR: AFOSR, XF
TR-90-1203, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The major concern of this year's research was modeling the neural systems of the barn owl that determine the elevation of sound sources. Models of the nucleus ventralis lemnisci lateralis pars posterior (VLVp) and the lateral shell of the central nucleus of the inferior colliculus (ICL) were developed. Computer simulations demonstrated that these models could account for the most salient experimental phenomena. Future work will test predictions of the models, and hopefully lead to a closed-loop interaction between theory and experiment.

DESCRIPTORS: (U) , CLOSED LOOP SYSTEMS, COMPUTERIZED SIMULATION, ELEVATION, INTERACTIONS, NERVE CELLS, NERVOUS SYSTEM, PREDICTIONS, SOUND GENERATORS, TARGETS, TEST AND EVALUATION.

IDENTIFIERS: (U) Barn owls, PE61102F, WUAFOSR2313A9, Auditory nerve/reflexes, Birds/brain, Sound/position location, Computerized/simulation, Neurobiology, Auditory perception.

AD-A230 409 20/12 20/13

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

(U) Superconductivity and Superconductive Electronics.

DESCRIPTIVE NOTE: Annual rept. 15 Oct 89-14 Oct 90,

DEC 90 19P

PERSONAL AUTHORS: Beasley, M. R.

CONTRACT NO. F49620-89-C-0001

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR, XF
TR-90-1205, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Stanford Center for Research on Superconductivity and Superconductive Electronics is currently focused on developing techniques for producing increasingly improved films and mul'ilayers of the high-temperature superconductors, studying their physical properties and using these films and multilayers in device physics studies. In general the thin film synthesis work leads the way. Once a given film or multilayer structure can be made reasonably routinely, the emphasis shifts to studying the physical properties and device physics of these structures and on to the next level of film quality or multilayer complexity. Our most advanced thin films synthesis work in the past year has involved developing techniques to deposit a-axis and c-axis YBCO/PBCO superlattices and related structures. The in situ feature is desireable because no solid state reactions with accompanying changes in volume, morphology, etc., that degrade the quality of the film involved. (RRH)

DESCRIPTORS: (U) , ELECTRONICS, FILMS, HIGH TEMPERATURE, LAYERS, PHYSICAL PROPERTIES, PHYSICS, QUALITY, REACTION KINETICS, SOLID STATE PHYSICS, SUPERCONDUCTIVITY, SUPERCONDUCTORS.

IDENTIFIERS: (U) WUAFOSR2306C1, PE61102F.

AD-A230 361 11/2

SOUTHWEST RESEARCH INST SAN ANTONIO TX

(U) Study of High Temperature Failure Mechanisms in Ceramics.

DESCRIPTIVE NOTE: Annual rept. Dec 89-Nov 90,

NOV 90 62P

PERSONAL AUTHORS: Page, Richard A.; Lankford, James; Chan, Kwai S.

REPORT NO. SWRI-2253/2

CONTRACT NO. F49620-88-C-0081

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1204, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This annual report documents the results of a basic research program aimed at (1) studying the high temperature failure mechanisms in ceramics, (2) establishing relationships between cavitation mechanisms and creep crack growth characteristics, and (3) developing a damage mechanism-based life prediction model. During the reporting period, the growth rate, near-tip creep responses, and damage processes of creep cracks in a pyroceram glass-ceramic were studied under tensile loading at elevated temperatures. The results of these studies indicated that creep crack growth in the pyroceram glass-ceramic occurred both in continuous and discontinuous manners, with the damage processes manifested as the nucleation, growth, and coalescence of inhomogeneously distributed cavities and microcracks. Sintering of cavities led to the existence of a growth threshold below which the creep crack would open, blunt, but not propagate. Measurements of the total accumulated creep strain near the crack-tip revealed that creep crack extension followed a critical strain criterion. Relationships between cavitation mechanisms and creep crack growth characteristics of the glass-ceramic are discussed.

AD-A230 361 CONTINUED

DESCRIPTORS: (U) , CAVITATION, CAVITIES, CERAMIC MATERIALS, COALESCENCE, CRACK PROPAGATION, CRACKS, CREEP, DAMAGE, FAILURE, GROWTH(GENERAL), HIGH TEMPERATURE, LOADS(FORCES), MICROCRACKING, NUCLEATION, RATES, SINTERING, TENSILE PROPERTIES, THRESHOLD EFFECTS.

IDENTIFIERS: (U) Ceramic materials, Glass ceramics, Creep crack growth, Cavitation mechanisms, Pyroceram glass ceramics, PE61102F, WUAFOSR2306A2.

AD-A230 361

AD-A230 299 20/5

ARKANSAS UNIV FOR MEDICAL SCIENCES LITTLE ROCK

(U) NMR Imaging of Elastomeric Materials.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 89-31 Jul 90, NOV 90 43P

PERSONAL AUTHORS: Komoroski, Richard A.; Sarkar, Subhendra N.; Wooten, E. W.

CONTRACT NO. AFOSR-89-0418

PROJECT NO. 2306

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1185, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) NMR imaging has been applied to some elastomeric materials of industrial and military interest. The T2 spin-spin relaxation times of common elastomers, particularly after filling and curling, are sufficiently short that spin-echo sequences at submillisecond echo times cannot produce T2-independent images. The sensitivity to T2 potentially makes spin echo imaging a good probe of elastomer blend composition, as demonstrated for a series of filled and cured cis-polybutadiene, styrene-butadiene rubber blends. The technique can be used to distinguish good and bad carbon black dispersion in actual tire tread samples. The configuration of polyester tire cord, voids, rubber layer boundaries, apparent migration of additives, and other inhomogeneities can be detected in end-product tire samples. NMR images have been obtained for four porous glass disks of different porosities as models of materials such as oil cores. The mottled appearance often seen for such images is attributed largely to insufficient signal-to-noise ratio, and not pore structures. Comparison of spin-echo and gradient-echo images demonstrates the defect-magnification effect of the gradient-echo.

DESCRIPTORS: (U) , ADDITIVES, BOUNDARIES, CARBON BLACK, CHEMICAL COMPOSITION, CORDAGE, CORES, DISKS, DISPERSING,

AD-A230 299

AD-A230 299 CONTINUED

ECHOES, ELASTOMERS, GLASS, IMAGES, LAYERS, MATERIALS, MIGRATION, MIXTURES, MODELS, OILS, POLYESTER PLASTICS, POROSITY, POROUS MATERIALS, RUBBER, SAMPLING, SIGNAL TO NOISE RATIO, SPINNING(MOTION), TIRES, TREADS.

IDENTIFIERS: (U) *NMR(Nuclear Magnetic Resonance), Imaging, Elastomers, Tires, Composite materials, Porous materials, Spin echoes, Lithium 7, Relaxation, Theses, Fluorine 19, Oil cores, Interfaces, Curing, Fillers, WUAFOSR2306A3, PE61102F.

AD-A230 283 12/9

INTERNATIONAL NEURAL NETWORK SOCIETY BETHESDA MD

(U) Annual Meeting of International Neural Network Society.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 90,

JUL 90 68P

PERSONAL AUTHORS: Grossberg,

CONTRACT NO. AFOSR-88-0258

PROJECT NO. 2305

TASK NO. K5

MONITOR: AFOSR, XF
TR-90-1178, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The 1988 First Annual Meeting of the International Neural Network Society (INNS) brings together over 2,000 academic commercializers, and financiers in an open forum for the advancement of the full spectrum of significant neural network research and development, from biology through technology. Formed in 1987 in response to the extraordinary international interest in neural network research, INNS includes among its founders many of the most distinguished leaders of the field. By Spring, 1988, INNS membership had grown to over 2,000 of the field's most active researchers, from 34 countries and 47 states in the United States. These are the people who will determine the future of this strategic technology. The INNS invites all those interested in the exciting, and rapidly expanding field of neural networks to attend its 1988 Annual Meeting. The meeting included plenary lectures, symposia, contributed oral and poster presentations, tutorials, commercial and publishing exhibits, government agency presentations, and social events. Papers pertain to: Pattern Recognition; Network Analysis; Cognition and Learning; Neurobiology; Speech; Sensory-motor Control and Robotics; Implementations: Optics and VLSI; Applications; Vision; Neurocomputers.

DESCRIPTORS: (U) , BIOLOGY, COGNITION, INTERNATIONAL, LEADERSHIP, LEARNING, LECTURES, NETWORK

AD-A230 283 CONTINUED

ANALYSIS(MANAGEMENT), NEURAL NETS, NEUROBIOLOGY, OPTICS, PATTERN RECOGNITION, ROBOTICS, SOCIETIES, SPECTRA, SPEECH, STRATEGIC WEAPONS, SYMPOSIA, UNITED STATES, VISION.

AD-A230 281 9/5

CALIFORNIA UNIV BERKELEY SPONSORED PROJECTS OFFICE

(U) Magnetic Resonance of Defects in Hetero-Epitaxial Semiconductor Structures.

DESCRIPTIVE NOTE: Annual rept. 15 Apr 89-14 Apr 90,

APR 90 11P

PERSONAL AUTHORS: Weber, Eicke R.

CONTRACT NO. AFOSR-88-0162

PROJECT NO. 2305

MONITOR: AFOSR, XF
TR-90-1181, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research in the reporting period was concentrated on the continuation of a pioneering study of the defects present in thin film GaAs grown by MBE at temperatures between 190 and 300 degree. These layers have attracted recently great interest as buffer layers for the suppression of sidegating between MESFET devices and as active layers for ultrafast photodetectors working in the sub-picosecond range. A comprehensive analysis by magnetic resonance, infrared absorption, Hall effect, x-ray diffraction and particle-induced X-ray emission showed that the transport in these very As-rich layers is dominated by a hitherto unknown kind of hopping conduction between localized arsenic antisite defects present in concentrations up to 10(20)cm(3) and partly compensated by up to 10(18)cm(3) acceptors. The total concentration of excess As reached values pf 6x10(20)cm(3) , corresponding to AsGa = 1.03. This was found together with a lattice expansion of up to 0.15 percent. Thermal annealing to temperatures higher than 500 degree C resulted in disappearance of the lattice expansion, a reduction of the antisite defect concentration by at least two orders of magnitude, and the disappearance of hopping conduction. Optically detected magnetic resonance (ODMR) experiments using luminescence emission were successfully implemented, but the luminescence of low-temperature grown GaAs turned out to be too small for detection by ODMR.

AD-A230 281 CONTINUED

DESCRIPTORS: (U) , ABSORPTION, ANNEALING, ARSENIC, BUFFERS, DEFECTS(MATERIALS), DETECTION, EMISSION, GALLIUM ARSENIDES, HALL EFFECT, HIGH RATE, LAYERS, LOW TEMPERATURE, LUMINESCENCE, MAGNETIC RESONANCE, PHOTODETECTORS, TEMPERATURE, THERMAL RADIATION, THIN FILMS, ABSORPTION, ANNEALING, ARSENIC, BUFFERS, DEFECTS(MATERIALS), DETECTION, EMISSION, GALLIUM ARSENIDES, HALL EFFECT, HIGH RATE, LAYERS, LOW TEMPERATURE, LUMINESCENCE, MAGNETIC RESONANCE, PHOTODETECTORS, TEMPERATURE, THERMAL RADIATION, THIN FILMS.

IDENTIFIERS: (U) Gallium arsenides, Magnetic resonance, Low temperature, Epitaxial semiconductors, Semiconductors, Optoelectronic devices, WUAFOSR2305C1.

AD-A230 280 6/11

WISCONSIN UNIV-MADISON SCHOOL OF PHARMACY

(U) Toxicology of Perfluorodecanoic Acid.

DESCRIPTIVE NOTE: Final rept. 1 Jun 85-31 May 90,

NOV 90 17P

PERSONAL AUTHORS: Peterson, Richard E.

CONTRACT NO. AFOSR-85-0207

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1183, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Despite hypothyroxinemia, PFDA-treated rats are not functionally hypothyroid. Furthermore, any alteration in functional thyroid status can be dissociated from the overt toxicity (i.e., severe hypophagia and body weight loss). PFDA exerts effects on neutral lipid metabolism in both liver and carcass of the rat. At 7 days following a single administration of PFDA, hepatic esterification of free fatty acid into TG and CE was increased yet the expected augmentation in the export of these neutral lipids from liver into plasma was absent. An efficient chemical method was developed for the purification of commercially available PFDA that contains contaminants of mono- and diprotio-substituted materials. PFDA of high specific activity has been synthesized with 14 C-labeling in the C-1 position. In vivo experiments indicate that perfluorinated acid derived radioactivity found in rat tissues behaves similarly to PFDA or PFOA added directly to frozen rat tissue. Hepatic oxidation of long-chain medium-chain and short-chain fatty acids was unaffected by pretreatment with PFDA or PFOA. Similarly, esterification was not affected.

DESCRIPTORS: (U) , ACIDS, BODY WEIGHT, CHEMICAL REACTIONS, EFFICIENCY, ESTERS, FATTY ACIDS, FLUORINATION, IN VIVO ANALYSIS, LIPID METABOLISM, LIPIDS, LIVER, NEUTRAL, OXIDATION, PURIFICATION, RADIOACTIVITY, RATS, THYROID GLAND, TISSUES(BIOLOGY), TOXICITY, WEIGHT

AD-A230 280 CONTINUED

REDUCTION.

IDENTIFIERS: (U) Hypothyroxinemia, Perfluorodecanoic acid, Toxicocology, Toxic effects, Thyroid gland, PE61102F, WUAFOSR2312A5.

AD-A230 277 20/6.1

LASERGENICS CORP SAN JOSE CA

(U) Single Crystal Fibers of MGO:LiNbO3.

DESCRIPTIVE NOTE: Final rept. 29 Jun-7 Aug 90,

AUG 90 43P

PERSONAL AUTHORS: Schlecht, Richard G.

CONTRACT NO. F49620-88-C-0084

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1189, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) As optical instruments and devices see a broader and wider use it becomes necessary to increase their efficiency in order to make them more compact and lighter in weight, particularly for space applications. Nonlinear optical devices, such as second harmonic generators and parametric oscilators, will be an important part of this in order to create new wavelengths and tunable sources. If these devices can be made in fiber form, a significant improvement in efficiency will result. It will then be possible to use the efficient semiconductor lasers as a pump in spite of their poor beam quality. We have investigated the growth of Mg: LiNbO3 in fiber form using the laser-heated pedestal-growth technique. We were able to grow fibers of good optical quality without resorting to post-growth processing. However, we did anneal the fibers to improve their mechanical properties. Different techniques were tried to pole the fibers with limited success.

DESCRIPTORS: (U) , EFFICIENCY, FIBERS, FREQUENCY, HARMONIC GENERATORS, MECHANICAL PROPERTIES, NONLINEAR SYSTEMS, OPTICAL EQUIPMENT, OPTICAL INSTRUMENTS, OPTICAL PROPERTIES, OSCILLATORS, PARAMETRIC ANALYSIS, SEMICONDUCTOR LASERS, SINGLE CRYSTALS, SOURCES, SPACE TECHNOLOGY, TUNING.

IDENTIFIERS: (U) Single crystal fibers, Nonlinear optic,

AD-A230 277 CONTINUED

Crystal growth, Optical materials, Magnesium oxide, Lithium niobium oxide, MFO:LiNbO3, Laser applications, Fiber optics, PE61102F, WUAFOSR3005A1.

AD-A230 271 6/4

NORTHEASTERN UNIV BOSTON MA

(U) Center for the Study of Rhythmic Processes.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Apr 90,

DEC 90 15P

PERSONAL AUTHORS: Kopell, N.

CONTRACT NO. F49620-87-C-0013

PROJECT NO. 3484

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1190, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Center for the Study of Rhythmic Processes began operation in the academic year 1986-1989 and was supported as a Center of Excellence through June 1990. The Center gathered together mathematicians and biologists to work on problems involving neural control of rhythmic motor behavior. There were two main problems addresses during this time. One was the structure and function of the intersegmental coordinating system of the vertebrate spinal cord, using the lamprey as the prototypic example. A broadly applicable mathematical framework was developed and applied. The major research Centers of the country working on this preparation were consolidated under the auspices of the Center. The new collaborations led to the design and performance of new experiments based on the mathematics. The second problem was the structure and function of small neural networks, such as the crustacean stomatogastric ganglion. Work was performed on tasks ranging from the biophysics of individual cells to emergent properties of the network.

DESCRIPTORS: (U) , BIOLOGISTS, BIOPHYSICS, CIRCADIAN RHYTHMS, CONTROL, MATHEMATICS, MOTOR REACTIONS, NERVES, NETWORKS, NEURAL NETS, SPINAL CORD, VERTEBRATES.

IDENTIFIERS: (U) Oscillators, Spinal cords, Regeneration, Central pattern generators, Mathematical models, Sensory feedback, Neural network, Neuromodulators, Rhythmic motor

AD-A230 271 CONTINUED

behavior, PE61103F, WUAFOSR3484A4.

AD-A230 227 12/4

CALIFORNIA UNIV BERKELEY DEPT OF INDUSTRIAL ENGINEERING AND OPERATIONS RESEAR CH

(U) Stochastic Models in Reliability.

DESCRIPTIVE NOTE: Final rept. 1 Aug 89-30 Jun 90,

JUN 90 5P

PERSONAL AUTHORS: Ross, Sheldon M.

CONTRACT NO. AFOSR-89-0424

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1195, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) There were two principal accomplishments during the grant period. The first gives a new more effective reordering role for processing jobs (that may not complete) on a multiprocessor system. This is shown to improve on the previously known MF (move to front) and MB (move to back) ordering rules. The other accomplishment was a new variance reduction method in simulation, using 'random hazards' in a Markov process.

DESCRIPTORS: (U) , HAZARDS, JOBS, MARKOV PROCESSES, MATHEMATICAL MODELS, MULTIPROCESSORS, PROCESSING, REDUCTION, SIMULATION, STOCHASTIC PROCESSES, VARIATIONS.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 226 12/3 6/3

OREGON STATE UNIV CORVALLIS DEPT OF MATHEMATICS

(U) Probability and Dynamics.

DESCRIPTIVE NOTE: Final rept. 15 Feb 88-14 Feb 90,

FEB 90 3P

PERSONAL AUTHORS: Burton, Robert M.

CONTRACT NO. AFOSR-88-0105

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1197, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Several substantive results were found during the research period, bearing on mixing processes and percolation theory. A counter example to the o - mixing weak Bernoulli conjective was discovered. Polya urn methods were successfully applied to rate functions for dependent processes. In an important bio-systems application, the nervous system of the sea slug was found to be chaotic. (kr)

DESCRIPTORS: (U) , FUNCTIONS, LOW STRENGTH, MIXING, NERVOUS SYSTEM, PERCOLATION, RATES, THEORY.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

AD-A230 204 17/10 8/3 17/1

HAWAII INST OF GEOPHYSICS HONOLULU

(U) Hydrophone Investigations of Earthquakes and Explosion Generated High-Frequency Seismic Phases.

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Sep 90,

DEC 90 6P

PERSONAL AUTHORS: Walker, Daniel

CONTRACT NO. AFOSR-89-0339

PROJECT NO. 2309

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1176, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) An additional year of data was acquired from the Wake Island hydrophone array for use in a wide variety of research topics including underground nuclear testing and studies of surface generated water column noise and ocean bottom noise. A new, efficient recording system was installed, tested and proven effective. Progress in dissertation research continued and some additional needed support and interest was provided by other agencies. (mm)

DESCRIPTORS: (U) , ARRAYS, EARTHQUAKES, EFFICIENCY, HYDROPHONES, NOISE, NUCLEAR EXPLOSION TESTING, OCEAN BOTTOM, PACIFIC OCEAN ISLANDS, RECORDING SYSTEMS, UNDERGROUND EXPLOSIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2309A2, Hydrophones, Underwater acou stics/waveguides, Ocean surface/noise, Ocean bottom/noise, Underwater/volcanism, Earthquakes/ detection, Seismic detection, Nuclear explosion detection.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 202 11/6.1

TEXAS UNIV AT AUSTIN

(U) Understanding the High Temperature Behavior of Niobium Aluminides; First Year Summary Report.

DESCRIPTIVE NOTE: Annual Progress rept. 1 Dec 89-30 Nov 90,

NOV 90 7P

PERSONAL AUTHORS: Tien, John K.

REPORT NO. UTSMRDL-TR-9001

CONTRACT NO. AFOSR-90-0070

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1180, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The mechanical and physical properties of Niobium Aluminide intermetallics for high temperature aerospace applications have been measured. NbA1 sub 3 was induction melted. Metallographic and chemical analysis has been performed to confirm the composition and microstructure. The coefficient of thermal expansion was determined. Mechanical testing included elevated temperature elastic modulus and microhardness. Continuing work will focus on applying high temperature microhardness with varying load time to creep properties. Also, ingots of the two other intermetallic phases will be received shortly, with similar characterization to follow. Near-net shape processing may be used to form test specimens. A transmission electron microscopy effort will be used to identify deformation mechanisms.

DESCRIPTORS: (U) , AEROSPACE SYSTEMS, ALUMINIDES, BEHAVIOR, CHEMICAL ANALYSIS, COEFFICIENTS, CREEP, DEFORMATION, ELECTRON MICROSCOPY, HIGH TEMPERATURE, INTERMETALLIC COMPOUNDS, MECHANICAL PROPERTIES, METALLOGRAPHY, MICROHARDNESS, MICROSTRUCTURE, MODULUS OF ELASTICITY, NIOBIUM, NIOBIUM COMPOUNDS, PHYSICAL PROPERTIES, TEST AND EVALUATION, TIME, TRANSMITTANCE.

AD-A230 202

AD-A230 202 CONTINUED

IDENTIFIERS: (U) Niobium aluminides, Intermetallic, High tempature alloys; Mechanical properties, PE61102F, WUAFOSR2306A1.

AD-A230 202

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 193 12/3

CONNECTICUT UNIV STORRS DEPT OF ELECTRICAL AND SYSTEMS ENGINEERING

(U) Time-Reversion of a Hybrid State Stochastic Difference System with a Jump-Linear Smoothing Application,

JUL 90 14P

PERSONAL AUTHORS: Blom, Henk A.; Bar-Shalom, Yaakov

CONTRACT NO. AFOSR-88-0202

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1196, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Information Theory, v36 n4 p836-847 Jul 90.

ABSTRACT: (U) The reversion in time of stochastic difference equation in hybrid space with a Markovian solution is presented in this reprint. The reversion is obtained by a Martingale approach, which previously led to reverse time forms for stochastic equations with Gauss-Markov of diffusion solutions. The reverse time equations follow from a particular noncanonical Martingale decomposition, while the reverse time equations for Gauss-Markov and diffusion solutions followed from the canonical Martingale decomposition. The need for this noncanonical decomposition stems from the hybrid state space situation. Moreover, the non-Gaussian discrete time situation leads to reverse time equations that incorporate a Bayesian estimation step. The latter step is carried out for linear systems with Markovian switching coefficients, and the result is shown to provide the solution to the problem of fixed-interval smoothing. For an application of this smoothing approach to a trajectory with sudden maneuvers, simulation results are given to illustrate the practical use of the reverse time equations obtained.

DESCRIPTORS: (U) , BAYES THEOREM, COEFFICIENTS, DECOMPOSITION, DIFFERENCE EQUATIONS, DIFFUSION, EQUATIONS,

AD-A230 193 CONTINUED

ESTIMATES, HYBRID SYSTEMS, LINEAR SYSTEMS, MARKOV PROCESSES, REPRINTS, REVERSIBLE, SIMULATION, SOLUTIONS(GENERAL), STOCHASTIC PROCESSES, SWITCHING, TIME, TRAJECTORIES.

IDENTIFIERS: (U) WUAFOSR2304A1, PE61102F.

AD-A230 192 5/9 5/8

ILLINOIS UNIV AT URBANA DEPT OF PSYCHOLOGY

(U) Reminding-Based Category Learning.

DESCRIPTIVE NOTE: Journal article,

90 18P

PERSONAL AUTHORS: Ross, Brian H.; Perkins, Susan J.; Tenpenny, Patricia L.

CONTRACT NO. AFOSR-89-0447

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1192, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Cognitive Psychology, v22 p460-492 1990.

ABSTRACT: (U) Four experiments examine a reminding-based generalization view of category learning. According to this proposal, when subjects categorize a new instance by use of an earlier instance, they learn about the aspects common to the two instances and this knowledge may be used in later categorizations. Experiment I demonstrates that which earlier instance is used to categorize a new instance affects performance on a later category test. Two assumptions of this view are then tested. Experiment 2 provides evidence for the necessity of distinct instance representations to obtain this effect. Experiment 3 shows that the reminding effect is due to the presence of the common aspects and not imply to the increased availability of the instance of which one is reminded. The final experiment extends the reminding-based learning idea to a situation in which feature relevance is provided. This study shows that the reminding determines whether this relevance has an effect later on categorization time for individual features. Discussion focuses on the implications of these results for theories of category learning. (EMA)

DESCRIPTORS: (U) , LEARNING.

AD-A230 192

AD-A230 192 CONTINUED

IDENTIFIERS: (U) Categorization time, Reminding-based generalization, Categorization, Learning, Reprints, Transfer of training, WUAFOSR2313A4, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 176 9/3

STANFORD UNIV CA

(U) Surface-Catalyzed Chemiluminescence.

DESCRIPTIVE NOTE: Final rept. 15 Apr-14 Oct 90,

DEC 90 5P

PERSONAL AUTHORS: Zare, Richard N.

CONTRACT NO. AFOSR-90-0254

PROJECT NO. 1692

TASK NO. 08

MONITOR: AFOSR, XF
TR-90-1200, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Intense red emission peaking at 703 mm was observed when a heated metal wire was placed downstream of an O2 generator used in the chemical oxygen iodine laser (COIL) system. The O2 is produced by bubbling Cl2 through an alkaline solution of H2O2. Evidence has been found that this strong red emission requires the presence of both O2 and Cl2 in contact with a heated metal surface. Several metals have been used. The red emission spectrum is independent of the metal and the intensity is strongest for cooper. An attempt was made to observe laser action but no gain was detected. The identity of the species responsible for the strong red emission has not been established.

DESCRIPTORS: (U) , CHEMICAL LASERS, EMISSION, EMISSION SPECTRA, HEAT, INTENSITY, IODINE, LASERS, METALS, OXYGEN, RED(COLOR), SURFACES, WIRE.

IDENTIFIERS: (U) Visible chemical laser, O2(1Delta g), Surface-catalyzed emission, *Chemical lasers.

AD-A230 175 7/6

MASSACHUSETTS UNIV AMHERST DEPT OF POLYMER SCIENCE AND ENGINEERING

(U) Ultrastructure Processing of Macromolecular Materials.

DESCRIPTIVE NOTE: Final rept. 10 Oct 88-9 Feb 90,

NOV 90 20P

PERSONAL AUTHORS: Karasz, Frank E.

CONTRACT NO. AFOSR-89-0069

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1199, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In the investigations of polymer blends we have continued efforts in the areas of microstructural effects on miscibility in copolymers, of segmental interactions (hydrogen bonding) in high temperature blends and in solid state NMR studies of blend structure. In our studies of electrically and non-linearly active conjugated polymers we have emphasized structural studies of poly-p-phenylene vinylene and derivatives, blends, and analogues. We have also completed ultrastructural processing investigations on these materials as well as collaborative studies of the effect of processing on the optical properties.

DESCRIPTORS: (U) , COPOLYMERS, HIGH TEMPERATURE, HYDROGEN BONDS, MACROMOLECULES, MATERIALS, MICROSTRUCTURE, MIXING, MIXTURES, OPTICAL PROPERTIES, POLYMERS, PROCESSING, STRUCTURAL PROPERTIES.

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F.

AD-A230 167 9/1 20/3

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) SIS Mixer Research.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 89-13 May 90,

NOV 90 13P

PERSONAL AUTHORS: Lichtenberger, Arthur W.; Feldman, Marc J.

REPORT NO. UVA/525704/EE91/101

CONTRACT NO. AFOSR-89-0233

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR, XF
TR-90-1179, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Theoretical and experimental research has been conducted to elucidate the basic physics behind the properties of superconductor-insulator-superconductor (SIS) tunnel junction receiving devices. The properties of an SIS mixer using a slightly nonideal junction, with finite LO power, were determined by analytic expansion of the equations of the quantum theory of mixing. The resulting equations have a particularly simple form. The minimum noise temperature is controlled by the leakage current of the junction. Even the most nearly ideal junctions made today require a considerable LO for best sensitivity; nevertheless, even a comparatively large leakage current allows mixer noise to be only a small factor above the quantum limit. The saturation properties of SIS mixers subjected to broad-band thermal noise obey the equations derived for monochromatic saturating signals. The Josephson junction tuning inductor was analyzed with the conclusion that such a device is not feasible with present fabrication techniques. Computer calculations using synthetic SIS junction I-V characteristics predicted the performance of an optimized receiver over its entire operating frequency range. Many

aspects of the operation of SIS mixers were clarified and unexpected new phenomena were predicted. A 'photon picture' interpretation of the quantum theory of mixing is in the early stages of development. Niobium nitride edge junctions with excellent current-voltage characteristics were fabricated using novel barrier formation processes. The role of surface damage in the quality of NbN edge junction electrical characteristics was investigated and unexpected results were obtained.

DESCRIPTORS: (U) , BARRIERS, BROADBAND, COMPUTATIONS, COMPUTER APPLICATIONS, DAMAGE, EDGES, ELECTRIC COILS, ELECTRIC CURRENT, ELECTRICAL PROPERTIES, EQUATIONS, EXPANSION, FABRICATION, FREQUENCY, JOSEPHSON JUNCTIONS, JUNCTIONS, LEAKAGE(ELECTRICAL), LIMITATIONS, METHODOLOGY, NIOBIUM COMPOUNDS, NITRIDES, NOISE, NOISE(ELECTRICAL AND ELECTROMAGNETIC), OPTIMIZATION, PHYSICS, QUANTUM THEORY, RECEIVERS, SATURATION, SURFACES, TEMPERATURE, THERMAL RESISTANCE, TUNING DEVICES, TUNNELING(ELECTRONICS), VOLTAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C3, Local oscillators, Superconductivity, Millimeter wave detectors, Mixers.

AD-A230 166 6/4

NORTHEASTERN UNIV BOSTON MA

(U) Center for the Study of Rhythmic Processes.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 88-31 Dec 89,

DEC 90 10P

PERSONAL AUTHORS: Kopell, N.

CONTRACT NO. F49620-87-C-0013

PROJECT NO. 3484

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1191, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Center for the Study of Rhythmic Processes continued its work on Central Pattern Generators (CGPs), notably on the vertebrate spinal CPG for undulatory locomotion, and the invertebrate crustacean stomatogastric ganglion (STG). For the lamprey, a primitive vertebrate, experiments were designed and performed involving transduction of mechanical motion to neural activity; these experiments were combines with mathematical theory to help understand the relation of structure to function in that network. Other topics investigated included the effects of long coupling fibers, the relationship between muscle activation and movement, and the ability of the network to regenerate. Work on the STG included results on neuromodulators that change the output of the network and mathematical modelling of individual cells as well emergent properties of the network.

DESCRIPTORS: (U) , ACTIVATION, CIRCADIAN RHYTHMS, COUPLING(INTERACTION), FIBERS, GENERATORS, LOCOMOTION, MATHEMATICAL MODELS, MECHANICAL PROPERTIES, MOTION, MUSCLES, NETWORKS, NEURAL NETS, OUTPUT, PATTERNS.

IDENTIFIERS: (U) Oscillators, Spinal cord, Regeneration, Neural network , Neuromodulators, PE61103F, WUAFOSR3484A4.

AD-A230 165 12/7

ARIZONA UNIV TUCSON APPLIED MATHEMATICS PROGRAM

(U) Probabilistic Analysis of Neural Networks.

DESCRIPTIVE NOTE: Final rept. 1 Jun 88-30 Sep 90,

NOV 90 24P

PERSONAL AUTHORS: Faris, William G.; Newman, Charles M.

CONTRACT NO. AFOSR-88-189

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-1194, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research was a probabilistics study of neural network models. It was not oriented toward the workings of a particular device, but was intended to provide an understanding of the basic mechanisms of learning and recognition in neural networks. The main areas of progress were analysis of neural networks models, study of network connectivity, and investigation of computer network theory.

DESCRIPTORS: (U) , COMPUTER NETWORKS, LEARNING, MODELS, NETWORKS, NEURAL NETS, PROBABILITY, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A7.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 164 4/1 9/5

CALIFORNIA INST OF TECH PASADENA DEPT OF ELECTRICAL ENGINEERING

(U) Dense Modifiable Interconnections Utilizing Photorefractive Volume Holograms.

DESCRIPTIVE NOTE: Annual technical rept. 1 Dec 89-30 Nov 90,

NOV 90 19P

PERSONAL AUTHORS: Psaltis, Demetri; Qiao, Yong

CONTRACT NO. AFOSR-89-0045

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR, XF
TR-90-1169, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describe an experimental two-layer optical neural network built at Caltech. The system uses photorefractive volume holograms to implement dense, modifiable synaptic interconnections and liquid crystal light valves (LCVS) to perform nonlinear thresholding operations. Kanerva's Sparse, Distributed Memory was implemented using this network and its ability to recognize handwritten character-alphabet (A-Z) has been demonstrated experimentally. According to Kanerva's model, the first layer has fixed, random weights of interconnections and the second layer is trained by sum-of-outer-products rule. After training, the recognition rates of the network on the training set (104 patterns) and test set (520 patterns) are 100% and 50%, respectively.

DESCRIPTORS: (U) , DISTRIBUTION, LAYERS, LIGHT, LIQUID CRYSTALS, MEMORY DEVICES, RATES, RECOGNITION, TEST SETS, TRAINING, VALVES, WEIGHT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4.

AD-A230 108 12/9

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES SIGNAL AND IMAGE PROCESSING INS T

(U) Stability and Adaptation of Neural Networks.

DESCRIPTIVE NOTE: Annual technical rept. 1 Aug 89-31 Jul 90,

NOV 90 213P

PERSONAL AUTHORS: Kosko, Bart

CONTRACT NO. AFOSR-88-0236

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-1174, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Focused on unsupervised learning and adaptive fuzzy systems. Explored the differential competitive learning (DCL) law. We successfully benchmarked DCL against supervised competitive learning for phoneme recognition and centroid estimation. Proved structural stability for general competitive learning laws. Developed product-space clustering to develop adaptive fuzzy systems, which grow structured fuzzy rules from training data without supervision. Successfully benchmarked adaptive fuzzy systems against neural-network truck-and-trailer systems and Kalman-filter control systems for realtime target tracking.

DESCRIPTORS: (U) , ADAPTATION, ADAPTIVE SYSTEMS, CENTER OF GRAVITY, COMPETITION, ESTIMATES, LEARNING, NEURAL NETS, PHONEMES, REAL TIME, RECOGNITION, STABILITY, STRUCTURAL PROPERTIES, SUPERVISION, TARGETS, TRACKING, TRAINING, ADAPTATION, ADAPTIVE SYSTEMS, CENTER OF GRAVITY, COMPETITION, ESTIMATES, LEARNING, NEURAL NETS, PHONEMES, REAL TIME, RECOGNITION, STABILITY, STRUCTURAL PROPERTIES, SUPERVISION, TARGETS, TRACKING, TRAINING.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A230 097 11/6

NORTHWESTERN UNIV EVANSTON IL

(U) Control of Nanostructues in Ultrahigh-Strength Steels.

DESCRIPTIVE NOTE: Final rept.,

AUG 90 22P

PERSONAL AUTHORS: Olson, Gregory B.

REPORT NO. 0650-520-H407

CONTRACT NO. AFOSR-89-0356

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-90-1170

UNCLASSIFIED REPORT

ABSTRACT: (U) The development of fine-scale multicomponent M2C carbides in AF1410 steel was observed as a function of time at the standard tempering temperature of 510C. Strong departures from equilibrium compositions are observed at early stages of precipitation, and carbide composition appears to be particle size dependent in a given microstructure. Analysis of the carbide composition trajectory during precipitation in terms of the thermodynamic contributions of coherency and capillarity indicates initial nucleation at compositions of reduced interfacial energy but reduced chemical driving force. The ability of multicomponent carbides to follow a precipitation composition trajectory of increasing interfacial energy and increasing driving force appears important to the maintenance of a fine particle size and high number density at late stages of precipitation for overaging resistance. Preliminary evidence is also found for predicted nonuniformity of the matrix composition in the stress field of a coherent particle.

DESCRIPTORS: (U) , CAPILLARITY, CHEMICALS, COHERENCE, COMPOSITION(PROPERTY), ENERGY, FORCE(MECHANICS), HIGH DENSITY, INTERFACES, MATRIX MATERIALS, MICROSTRUCTURE, NUCLEATION, PARTICLE SIZE, PARTICLES, PRECIPITATION,

AD-A230 097 CONTINUED

REDUCTION, STRESSES, TEMPERATURE, TEMPERING.

IDENTIFIERS: (U) Nanostructures, M2C Carbide, Nonequilibrium composition, Interfacial energy, Coherency strain energy, High strength, *Carbon steels, *High strength alloys, WUAFROSR2306A1, PE61102F.

AD-A230 094 20/5

PURDUE RESEARCH FOUNDATION LAFAYETTE IN

(U) Production and Characterization of High-Energy Hypervalent Hydrides.

DESCRIPTIVE NOTE: Final rept. 1 Sep 87-31 Aug 90,

NOV 90 14P

PERSONAL AUTHORS: Grant, Edward R.

CONTRACT NO. F49620-87-C-0092

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1167, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress is described in a three-year program of research supported by AFOSR under the High-Energy-Density-Matter (HEDM) initiative. A laser-crossed molecular beam apparatus was constructed which is equipped to probe unique high-energy excited states by: (1) directly detecting anion photoproducts of charge-transfer intermediate excited states; (2) determining internal state distributions following photoionization of high-energy intermediates by time-of-flight photoelectron spectroscopy; and (3) characterizing ion-fragment disturbutions by time-of-flight mass spectroscopy. This instrument was employed in combination with a second, quadrupole molecular beam system to complete a set of experiments exploring structural and dynamical properties of high-energy matter. AFOSR supported experiments have detected anions arising from energetic charge-transfer configurations of monomeric HCl. Additional work on the same molecule, has probed intermediate-state effects on ion-fragment branching rations, and, by double-resonance, characterized the dynamics of rotationally state selected spin-orbit autoionization.

DESCRIPTORS: (U) , ANIONS, CHARGE TRANSFER, CONFIGURATIONS, DYNAMICS, FLIGHT, HIGH ENERGY, HYDRIDES, INTERNAL, IONIZATION, MASS SPECTROSCOPY, PHOTOELECTRON SPECTRA, PHOTOIONIZATION, PRODUCTION, STRUCTURAL

AD-A230 094 CONTINUED

PROPERTIES, TIME.

IDENTIFIERS: (U) HEDM(High Energy Density Matter), Hypervalent hydrides, Valence bands, Lasers, Photoelectron spectroscopy.

AD-A230 072 6/10

COLORADO STATE UNIV FORT COLLINS DEPT OF PHYSIOLOGY AND BIOPHYSICS

(U) The Phototoxicity of 'Blue Light' on the Functional Properties of the Retinal Pigment Epithelium.

DESCRIPTIVE NOTE: Final technical rept. 1 May 87-30 Sep 90,

OCT 90 17P

PERSONAL AUTHORS: Pautler, E. L.

CONTRACT NO. AFOSR-87-0189

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1184, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Irradiation of the isolated bovine retinal pigment epithelium with 430 nm light at 20 mW/cm2 inhibited the unidirectional flux of leucine, glutamate and chloride in the retina to choroid direction; however, this intensity also produced discernible damage to the mitochondria. Reducing the level of radiation did not affect any of the transport systems studied. Ascorbate, morin or vitamin E did not ameliorate the effect of blue light on transport, whereas melatonin did provide protection by forming an effective light filter. The combination of ethanol and exposure to blue light may constitute a health hazard for humans. Retina-derived factor(s) applied to the apical side of the preparation resulted in a stabilization of the TEP and SCC, followed by a secondary rise in both electrical parameters. These results lead to the hypotheses that the neural retina secretes a factor(s) which is essential for the regulation and maintenance of the RPE under normal physiological conditions and may facilitate repair processes in pathological states.

DESCRIPTORS: (U) , ASCORBATES, BLUE(COLOR), CHLORIDES, CHOROID PLEXUS, DAMAGE, ELECTRICAL PROPERTIES, EPITHELIUM, ETHANOLS, EXPOSURE(GENERAL), FLUX(RATE), FUNCTIONAL

AD-A230 072 CONTINUED

ANALYSIS, GLUTAMIC ACID, HAZARDS, HEALTH, HUMANS, HYPOTHESES, IRRADIATION, LEUCINE, LIGHT, MITOCHONDRIA, NERVOUS SYSTEM, OPTICAL FILTERS, PARAMETERS, PHYSIOLOGICAL EFFECTS, PIGMENTS, PREPARATION, PROTECTION, RADIATION, REPAIR, RETINA, SALTS, SIDES, TOXICITY, TRANSPORT, UNIDIRECTIONAL, VITAMIN E.

IDENTIFIERS: (U) Stress(physiology), *Eye, *Phototoxicity, *Eye damage, Retina, PE61102F, WUAFOSR2312A5.

AD-A230 071 9/5

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL AND COMPUTER ENGINEERIN G

(U) Research on Materials and Components for Opto-Electronics Signal Processing and Computing.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan 89-30 Jun 90,

JUN 90 19P

PERSONAL AUTHORS: Chang, William S.; Niki, Shigeru; Kellner, Albert L.; Wieder, H. H.

CONTRACT NO. AFOSR-89-0254

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR, XF
TR-90-1171, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project is a continuation of the project (AFOSR 84-0389) under the same title 'Research on Materials and Components for Opto-Electronic Signal Processing and Computing.' for the period Oct. 1st, 1984 to Nov. 30th, 1988. Recognizing both the importance of spatial light modulators (SLM) to opto-electronic computing and signal processing and the unique material properties of multiple quantum well (MQM) structures, we have focused our investigation on the electro-optical properties and the growth of InxGa1-xAs/GaAs strained layer material by the molecular beam epitaxy (MBE) method for the SLM's.

DESCRIPTORS: (U) , ELECTROOPTICS, EPITAXIAL GROWTH, LAYERS, LIGHT MODULATORS, MATERIALS, MOLECULAR BEAMS, QUANTUM THEORY, SIGNAL PROCESSING, SPATIAL DISTRIBUTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4.

AD-A230 024 11/6

CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL ENGINEERING AND MATE RIALS SCIENCE

(U) High-Temperature Metal Matrix Composites.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 89,

JUN 90 372P

PERSONAL AUTHORS: Thompson, A. W.

CONTRACT NO. F49620-87-C-0017

PROJECT NO. 3484

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1168, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Final Report, incorporating Year 3 of the University Research Initiative grant at Carnegie Mellon University on High-temperature Metal Matrix Structural Composites contains sections on processing, characterization, and mechanical properties. These are further divided into reports from individual tasks on powder blending and consolidation, composite performance, structure and composition of composite interfaces, fatigue crack growth, creep, and fracture behavior. Detailed findings, together with listings of technical presentations and publications, are presented in the individual reports from the six tasks conducted under this Grant.

DESCRIPTORS: (U) , BLENDING, COMPOSITE MATERIALS, CRACK PROPAGATION, CREEP, FRACTURE(MECHANICS), HIGH TEMPERATURE, MECHANICAL PROPERTIES, METAL MATRIX COMPOSITES, PERFORMANCE(ENGINEERING), POWDERS, PROCESSING.

IDENTIFIERS: (U) PE61102F, WUAFOSR3484A3.

AD-A230 016 9/1

TEXAS INSTRUMENTS INC DALLAS CENTRAL RESEARCH LABS

(U) Selective Heteroepitaxial Growth of Compound Semiconductors.

DESCRIPTIVE NOTE: Final rept. Aug 88-Oct 90,

NOV 90 58P

PERSONAL AUTHORS: Beam, Edward; Kao, Yung-Chung

REPORT NO. TI-08-90-53

CONTRACT NO. F49620-88-C-0106

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR, XF
TR-90-1166, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The effect of reduced growth area on the lattice mismatch accommodation of InxGa1-xAs/GaAs and GaAs/Si grown by molecular beam epitaxy (MBE) has been studied with cross-sectional transmission electron microscopy (XTEM)and cathodoluminescence (CL). Results indicate that the use of step-composition grading and linear-composition grading are particularly effective when combined with reduced growth areas and InxGa1-xAs compositions up to x = 0.25. Blanket areas with the same composition grading techniques exhibited randomly distributed threading dislocation-free regions approximately 30 microns in diameter, which were bounded by high-density dislocation pile-ups. (JS)

DESCRIPTORS: (U) , CATHODOLUMINESCENCE, CROSS SECTIONS, ELECTRON MICROSCOPY, EPITAXIAL GROWTH, GROWTH(GENERAL), MOLECULAR BEAMS, REDUCTION, SEMICONDUCTORS, TRANSMITTANCE.

IDENTIFIERS: (U) Selected area growth, Reduced area growth, GaAs/Si, InGaAs/GaAs, Defect density reduction, PE61102F, WUAFOSR2305C1.

AD-A229 979 20/4 20/13

MISSISSIPPI STATE UNIV MISSISSIPPI STATE DEPT OF MECHANICAL AND NUCLEAR ENGIN EERING

(U) Investigations of Surface Roughness Effects on Turbulent Flow and Heat Transfer.

DESCRIPTIVE NOTE: Final rept. 15 May 86-14 Sep 90,

OCT 90 270P

PERSONAL AUTHORS: Coleman, Hugh W.; Taylor, Robert P.; Hosni, M. H.

CONTRACT NO. AFOSR-86-0178

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1173, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary objective of this research program was to investigate the effects of surface roughness on turbulent boundary layer heat transfer by obtaining accurate, comprehensive, quality heat transfer data for zero pressure gradient incompressible air flow over constant temperature test surfaces with well-defined surface roughness geometries. Knowledge gained from the experimental investigation was used to improve and extend the roughness energy transport model used in the discrete element prediction method, thus enhancing and expanding the capability to predict the effects of surface roughness on turbulent flow and heat transfer. Fluid dynamics and heat transfer data for turbulent boundary layer flow over a smooth and five rough surfaces were taken in the Turbulent Heat Transfer Test Facility (THTTF) for x-Reynolds numbers ranging up to 10,000,000. The smooth wall data was used for qualification of the THTTF and provided base line data for comparison with the data from rough surfaces.

DESCRIPTORS: (U) , BASE LINES, BOUNDARY LAYER FLOW, ENERGY TRANSFER, FLUID DYNAMICS, HEAT TRANSFER, MODELS, PREDICTIONS, QUALITY, ROUGHNESS, SURFACE ROUGHNESS, TURBULENT BOUNDARY LAYER, TURBULENT FLOW.

AD-A229 979 CONTINUED

IDENTIFIERS: (U) Heat transfer, Turbulent boundary layer, Surface roughness effects, PE61102F, WUAFOSR2307A4.

AD-A229 964 20/11

PRINCETON UNIV NJ DEPT OF CIVIL ENGINEERING

(U) Dynamic Rate Dependent Elastoplastic Damage Modeling of Concrete Subject to Blast Loading: Formulation and Computational Aspects.

DESCRIPTIVE NOTE: Final rept. 1 Sep 88-31 Aug 90, OCT 90 262P

PERSONAL AUTHORS: Ju, J. W.

REPORT NO. PU/CEOR/SM-90-9

CONTRACT NO. AFOSR-88-0324

PROJECT NO. 2302

TASK NO. C2

MONITOR: AFOSR, XF
TR-90-1182, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Advanced elastic-damage and elastoplastic-damage models are presented within the frameworks of both continuum damage mechanics and micromechanical damage mechanics. Novel energy-based coupled elastoplastic continuum damage theories and computational algorithms are proposed, including rate-dependent isotropic and anisotropic damage models. Efficient constitutive algorithms and extensive experimental validations are also performed. In addition, novel finite deformation elastoplastic continuum damage models are developed to account for large strains and high rates. On the other hand, advanced and state-of-the-art two- and three-dimensional micromechanical anisotropic damage models are proposed to physically simulate micromechanical microcracking kinetics (cleavage 1 and cleavage 2 processes) and damaged overall compliances for concrete materials under tensile and compressive loadings. These results are innovative, fundamental, and very useful in advanced damaged modeling. (JHD)

DESCRIPTORS: (U) , ALGORITHMS, BLAST LOADS, COMPUTATIONS, CONCRETE, CONTINUUM MECHANICS, DAMAGE, HIGH RATE, MATERIALS.

AD-A229 979 AD-A229 964

AD-A229 964 CONTINUED

IDENTIFIERS: (U) Damage mechanics, Elastic damage models, Elastoplastic damage models, Constitutive algorithms, Experimental validation, Micro-mechanical damage theories, Rate-dependent damage models, PE61102F, WUAFOSR2302C2.

AD-A229 961 20/5 7/4

POLYTECHNIC UNIV FARMINGDALE NY WEBER RESEARCH INST

(U) Nonequilibrium Effects in Ion and Electron Transport.

DESCRIPTIVE NOTE: Final rept. 1989-1990,

NOV 90 476P

PERSONAL AUTHORS: Gallagher, Jean W.; Hudson, David E.; Kunhardt, Erich E.; Van Brunt, Richard I.

CONTRACT NO. AFOSR-89-0453

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-1187, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This volume presents the contributions of the participants in the Sixth International Swarm Seminar, held August 2-5, 1989, at the Webb Institute in Glenn Cove, New York. The Swarm Seminars are traditionally held as relatively small satellite conferences of the International Conference on the Physics of Electronic and Atomic Collisions (ICPEAC) which occurs every two years. The 1989 ICPEAC took place in New York City prior to the Swarm Seminar. The focus of the Swarm Seminars has been on basic research relevant to understanding the transport of charged particles, mainly electrons and ions, in weakly ionized gases. This field that tends to bridge the gap between studies of fundamental binary atomic and molecular collision processes and studies of electrical breakdown or discharge phenomena in gases. Topics includes in the 1989 seminar ranged the gamut from direct determinations of charged-particle collision cross sections to use of cross sections and swarm parameters to model the behavior of electrical gas discharges. The range of subjects covered was in many respects similar to that of previous seminars. (js)

DESCRIPTORS: (U) , ARTIFICIAL SATELLITES, ATOMS, BREAKDOWN(ELECTRONIC THRESHOLD), CHARGED PARTICLES, COLLISIONS, CROSS SECTIONS, ELECTRIC DISCHARGES, ELECTRON TRANSPORT, ELECTRONS, GAS DISCHARGES, GASES,

AD-A229 961 CONTINUED

INTERNATIONAL, IONIZED GASES, IONS, MOLECULAR PROPERTIES, NEW YORK, NEW YORK(NEW YORK), NONEQUILIBRIUM FLOW, PARTICLE COLLISIONS, PHYSICS, SYMPOSIA, TRANSPORT.

IDENTIFIERS: (U) Swarm parameters, Charged particle collisions, Electrical gas discharges.

AD-A229 933 11/2

ILLINOIS UNIV AT URBANA DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Transformation Toughening of Composite Ceramics.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 89-30 Sep 90,

OCT 90 28P

PERSONAL AUTHORS: Kriven, Waltraud M.

REPORT NO. UILU-ENG-90-5017

CONTRACT NO. AFOSR-89-0300

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1186, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research is underway into the application of martensitic transformations in ceramics to toughen a variety of ceramic-ceramic composites, i.e., to reduce their brittleness. The toughening agents of interest and their volume changes are dicalcium silicate (Ca_2SiO_4, 12%), nickel sulfide (NiS, 4%), lanthanide sesquioxides (Ln_2O_3, 8%) and lutentium borate ($LuBO_3$, 8%). Ceramic processing routes have been developed to fabricate different types of toughened composites, viz., either by using a dispersed second phase microstructure or as a fine grained, single phase material. Specifically, Ca_2SiO_4 has been dispersed in $CaZrO_3$ and the mechanical properties measured by bend tests. The critical importance of matrix toughness and grain size, as well as role of intergranular microcracking has been established. Dense pellets of fine grained, pure beta-Ca_2SiO_4 have been sintered and their transformability by grinding established. Their microstructures were examined by TEM and preliminary micromechanical studies made on it, and on Gd_2O_3, by indentation and SEM techniques. NiS inclusions in glass were examined by TEM and EDS and a sol gel processing route to precipitate NiS in glass has been identified. Composites of Dy_2O_3 in SiC and powders of $LuBO_3$ in B_2O_3 have been fabricated.

AD-A229 933 CONTINUED

DESCRIPTORS: (U) , BRITTLENESS, CALCIUM COMPOUNDS, CERAMIC MATERIALS, COMPOSITE MATERIALS, DISPERSIONS, GRAIN SIZE, GRINDING, HIGH DENSITY, MARTENSITE, MECHANICAL PROPERTIES, MICROSTRUCTURE, NICKEL COMPOUNDS, PELLETS, PROCESSING, ROUTING, SILICATES, SULFIDES, TEST AND EVALUATION, TRANSFORMATIONS, VOLUME.

IDENTIFIERS: (U) WUAFOSR2306A2, PE61102F.

AD-A229 837 12/1

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF COMPUTER SCIENCE

(U) Large Sparse Stable Matrix Computations.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-30 Jun 90,

OCT 90 9P

PERSONAL AUTHORS: Pothen, Alex; Barlow, Jesse L.

CONTRACT NO. AFOSR-88-0161

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-90-1156

UNCLASSIFIED REPORT

ABSTRACT: (U) The project proposal discussed two problem areas: (1) The solution of large sparse of linear equations; and (2) The solution of sparse least squares problems. We report significant progress in both of these areas and in a third area, the solution of the algebraic eigenvalue problem. The progress in solving systems of linear equations included an algorithm for computing ordering for efficiently factoring sparse symmetric, positive definite systems in parallel. We also made important progress in computing the ordering itself in parallel. Other progress included a method for handling singular blocks in a one-way dissection ordering and an error analysis of Gaussian elimination in unnormalized arithmetic. For linear least squares problems we developed an efficient reliable method for detecting the rank of a sparse matrix without column exhanges. The method used a static data structure. We also analyzed and compared methods for computing sparse and dense QR factorizations on message passing architectures. On the algebraic eigenvalue problem, we participated in resolving long standing open questions on relative perturbation bounds on certain diagonally dominant eigenvalue problems. (KR)

DESCRIPTORS: (U) *COMPUTATIONS, *SPARSE MATRIX, ALGEBRA, ALGORITHMS, DATA BASES, EFFICIENCY, EIGENVALUES, ERROR

AD-A229 837 CONTINUED

ANALYSIS, LEAST SQUARES METHOD, LINEAR ALGEBRAIC EQUATIONS, LINEARITY, PERTURBATIONS, RELIABILITY, PROBLEM SOLVING, STATICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A229 744 7/6

MASSACHUSETTS UNIV AMHERST DEPT OF POLYMER SCIENCE AND ENGINEERING

(U) A Center for Advanced Electrical and Structural Polymers.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-30 Dec 89,

NOV 90 38P

PERSONAL AUTHORS: Karasz, Frank E.

CONTRACT NO. F49620-89-C-0027

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1161, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The fourth thrust has sought to elaborate on novel macromolecular architectures and characterization and the fifth thrust comprises new processing technologies and is largely centered on FMI investigations of PPV film processing optimization and on the difficult problem of larger scale processing of semi-intractable high temperature blends. (TTL)

DESCRIPTORS: (U) *POLYMERS, ARCHITECTURE, ELECTRICAL PROPERTIES, FILMS, MACROMOLECULES, OPTIMIZATION, PROCESSING, SCALE, STRUCTURAL PROPERTIES, THRUST.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A229 743 5/8 6/4

FLORIDA UNIV GAINESVILLE DEPT OF PSYCHOLOGY

(U) Auditory Pattern Memory.

DESCRIPTIVE NOTE: Final rept. 1 Oct 88-30 Sep 90,

OCT 90 53P

PERSONAL AUTHORS: Sorkin, Robert D.

CONTRACT NO. AFOSR-89-0021

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-1164, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Three studies of temporal pattern perception were conducted. The listener's task was to determine whether or not two arrhythmic, tonal sequences formed the same temporal pattern. The first study tested the Pattern Correlation model. According to this model, the listener estimates the correlation between the pattern of time intervals marked by the tones in each sequence. Listener performance was characterized by an internal noise that is dependent on the average time between marker tones. The second study tested the effects of temporally compressing or expanding the stimuli. The transformations are common in speech and music; an important feature of temporal pattern perception is the ability to recognize patterns as simular, despite such transformations. An additional internal noise, proportional to the magnitude of the difference between the pattern transformations, was postulated to describe performance. In the third study, the stimuli were present' at different time delays and to separate earphone channels. At very short delays, waveform correlation is the likely comparison mechanism. At longer delays, pattern correlation is the probable mechanism, but this process is ineffective when the temporal patterns overlap. Keywords: Auditory, Perception, Pattern recognition. (emk)

DESCRIPTORS: (U) *AUDITORY SIGNALS, *MEMORY DEVICES, *PATTERN RECOGNITION, AUDIO TONES, CHANNELS, COMPARISON,

AD-A229 743 CONTINUED

CORRELATION, DELAY, EARPHONES, INTERNAL, MARKERS, MODELS, MUSIC, NOISE, PATTERNS, PERCEPTION, SHORT RANGE(TIME), SPEECH, STIMULI, TIME INTERVALS, TRANSFORMATIONS, WAVEFORMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A6.

AD-A229 612 21/5 20/4

MASSACHUSETTS INST OF TECH CAMBRIDGE GAS TURBINE LAB

(U) Air Force Research in Aero Propulsion Technology (AFRAPT).

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 Aug 90,

SEP 90 30P

PERSONAL AUTHORS: Dugundji, J.; Epstein, A.; Giles, M.; Greitzer, E.; Martinez-Sanchez, M.

CONTRACT NO. AFOSR-85-0288

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR
A4

UNCLASSIFIED REPORT

ABSTRACT: (U) This research grant consisted of ten separate projects: (1) Turbomachinery noise reduction through distortion amelioration; (2) Fluid mechanics of discrete passage diffusers; (3) Compressor stabilization through structural feedback; (4) Linearized Euler solutions for turbomachinery flutter and forced response; (5) Vortical flow behavior downstream of convoluted trailing edges; (6) Turbine blade tip forces; (7) Influence of inlet radial temperature distribution on turbine rotor heat transfer; (8) Effect of circumferential inlet distortion on the formation of turbine secondary flow vortices; (9) Inlet distortion with application to STOVL; (10) Instability and distortion in multistage compressors. Keywords: Unsteady flow in turbomachines; Computational fluid mechanics, Turbine aerodynamics; Heat transfer; Rotor dynamic instability; Active control of aeromechanical systems.

DESCRIPTORS: (U) *AERODYNAMICS, *TURBINES, *TURBOMACHINERY, AERODYNAMIC LOADING, AIR FORCE RESEARCH, COMPRESSORS, COMPUTATIONS, CONTROL, DIFFUSERS, DISTORTION, DISTRIBUTION, DOWNSTREAM FLOW, DYNAMICS, FEEDBACK, FLOW, FLUID MECHANICS, FLUTTER, HEAT TRANSFER, INLETS, LINEARITY, MECHANICS, NOISE REDUCTION, RADIUS(MEASURE), RESPONSE, ROTORS, SECONDARY FLOW, SOLUTIONS(GENERAL),

AD-A229 612 CONTINUED

SPATIAL DISTRIBUTION, STABILITY, STABILIZATION, STAGING, STRUCTURAL PROPERTIES, TEMPERATURE, UNSTEADY FLOW, VORTICES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A4, Aeromechanical systems.

AD-A229 591 7/5

TRW SPACE AND TECHNOLOGY GROUP REDONDO BEACH CA

(U) Initiation and Modification of Reaction by Energy Addition: Kinetic and Transport Phenomena.

DESCRIPTIVE NOTE: Final rept. 1 Sep 88-1 Sep 90,

OCT 90 149P

PERSONAL AUTHORS: Fendell, F. E.; Chou, M. S.; Zukowski, T. J.; Carrier, G. F.

CONTRACT NO. F49620-87-C-0081

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1140, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Laboratory experiments, supplemented by approximate theoretical studies, have been carried out on the photochemical ignition of a flowing homogeneous gaseous fuel-oxidizer premixture by nonintrusive energy addition. In the experimental task, we have successfully demonstrated the ignition of H2/O2 and CH4/O2 mixtures with photolysis of NH3 by use of an ArF laser at 193 nm. The theory, by a combination of numerical and approximate analytic methods, examines the interaction of premixture stoichiometry, preferential diffusion (i.e., differing diffusivities for heat and species), and flame radius, with respect to the outward propagation of a laminar flame from a single spheroidal kernel (if a flame develops). Previously reported observations of the variation of the flame-front speed with flame radius, sometimes interpreted in terms of preferential-diffusion effects but probably better interpreted in terms of radiative heat loss, have been examined; the need exists for further spherical-flame-propagation experiments, with emphasis on measurements taken when the flame radius is more nearly comparable to the flame thickness. (ttl)

DESCRIPTORS: (U) *RADIATIVE TRANSFER, ADDITION, APPROXIMATION(MATHEMATICS), ENERGY, FLAMES, HEAT LOSS, IGNITION, KINETICS, LABORATORY TESTS, LAMINAR FLOW,

AD-A229 591 CONTINUED

NUMERICAL METHODS AND PROCEDURES, PHOTOCHEMICAL REACTIONS, PHOTOLYSIS, PROPAGATION, RADIUS(MEASURE), SPHERES, THEORY, THICKNESS, TRANSPORT PROPERTIES, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A229 590 9/1

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Impurities, Defects and Diffusion in Semiconductors: Bulk and Layered Structures. Materials Research Society Symposium Proceedings. Volume 163.

DESCRIPTIVE NOTE: Final rept. 22 Nov 89-21 Nov 90,

NOV 90 1082P

PERSONAL AUTHORS: Ballance, Joan B.; Wolford, Donald J.; Bernholc, Jerzy; Haller, Eugene E.

CONTRACT NO. AFOSR-90-0081

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR-90-1059

UNCLASSIFIED REPORT

ABSTRACT: (U) This volume of proceedings c ontains manuscripts from Symposium G, entitled 'Impurities, Defects, and Diffusion in Semiconductors: Bulk and Layered Structures.' Historically, Symposium G was the seventh in a series of MRS-sponsored symposia which focused on various aspects of defects and defect properties in semiconducting materials. This symposium was conceived from the view that impurities, defects, and diffusion play key roles in modern-day research and development of semiconducting materials, structures, and devices. Recent breakthroughs in materials preparation with monolayer control, in diversity and sensitivity of characterization techniques, and in new theoretical methods, have collectively led to great advances in the understanding of defect- and impurity-related phenomena. (ttl)

DESCRIPTORS: (U) *SEMICONDUCTORS, CONTROL, DOCUMENTS, IMPURITIES, LAYERS, MATERIALS, METHODOLOGY, PREPARATION, STRUCTURES, SYMPOSIA, THEORY.

IDENTIFIERS: (U) WUAFOSR2306A2, PE61102F.

AD-A229 590

AD-A229 589 9/1

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Properties of II-VI Semiconductors: Bulk Crystals, Epitaxial Films, Quantum Well Structures, and Dilute Magnetic Systems. Materials Research Society Symposium Proceedings. Volume 161.

DESCRIPTIVE NOTE: Final rept. 22 Nov 89-21 Nov 90,

NOV 90 538P

PERSONAL AUTHORS: Ballance, Joan B.; Bartoli, F. J., Jr.; Schaake, H. F.; Schetzina, J. F.

CONTRACT NO. AFOSR-90-0081

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR-90-1052

UNCLASSIFIED REPORT

ABSTRACT: (U) The II-VI compound semiconductors possess characteristics which, as a group, are unique. Among the most active areas of investigation in these materials today are blue light emitters based on ZnSe, infrared detectors based on mercury-containing compounds such as HgCdTe, and the properties of dilute magnetic semiconductors. Each of these areas is represented by several papers included in this volume. (ttl)

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *FILMS, SYMPOSIA, BLUE(COLOR), CADMIUM TELLURIDES, CRYSTALS, DILUTION, EMITTERS, GROUP II-VI COMPOUNDS, INFRARED DETECTORS, LIGHT, MAGNETIC DEVICES, MAGNETIC MATERIALS, MERCURY COMPOUNDS, QUANTUM ELECTRONICS, SEMICONDUCTORS, STRUCTURES.

IDENTIFIERS: (U) WUAFOSR2306A2, PE61102F.

AD-A229 589

AD-A229 588 14/5

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) In-Situ Patterning: Selective Area Deposition and Etching. Materials Research Society Symposium Proceedings. Volume 158.

DESCRIPTIVE NOTE: Final rept. 22 Nov 89-21 Nov 90,

NOV 90 518P

PERSONAL AUTHORS: Ballance, Joan B.; Bernhardt, Anthony F. ; Black, Jerry G.; Rosenberg, Robert

CONTRACT NO. AFOSR-90-0081

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-90-1058

UNCLASSIFIED REPORT

ABSTRACT: (U) The MRS symposium on In-Situ Patterning: Selective Area Deposition and Etching brought together a wide selection of microfabrication technologies and detailed studies of their enabling mechanisms. The common thread through the invited and contributed papers is the chemical and/or physical alteration of surfaces by the actions of ion, electron, or photon energy. The applications ranged from state-of-the-art lithographic techniques, to direct processing of semiconductor surfaces, aiming to obviate lithography in device fabrication. This direct processing encompasses patterned deposition of metallic conductors and insulating films, as well as local etching and doping of device structures. The work demonstrated in this symposium ranged from the detailed atomic behavior of treated surfaces, to nuts-and-bolts packaging techniques for the high-density descendants of today's printed circuit boards. (TTL)

DESCRIPTORS: (U) *ETCHING, SYMPOSIA, ATOMIC PROPERTIES, DEPOSITION, DOPING, ELECTRIC CONDUCTORS, ELECTRONS, ENERGY, FABRICATION, FILMS, INSULATION, LITHOGRAPHY, METALS, MICROMINIATURIZATION, PHOTONS, PRINTED CIRCUIT BOARDS, PROCESSING, SELECTION, SEMICONDUCTORS, STATE OF THE ART, STRUCTURES, SURFACES, SYMPOSIA.

AD-A229 588

AD-A229 588 CONTINUED

IDENTIFIERS: (U) WUAFOSR2306A2, PE61102F.

AD-A229 587 11/2 11/4

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Processing Science of Advanced Ceramics. Materials Research Society Symposium Proceedings. Volume 155.

DESCRIPTIVE NOTE: Final rept. 15 Apr-14 Oct 89,

SEP 90 406P

PERSONAL AUTHORS: Aksay, I. A.; McVay, G. L.; Ulrich, D. R.

CONTRACT NO. AFOSR-89-0360

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-90-1057

UNCLASSIFIED REPORT

ABSTRACT: (U) Advanced ceramics and ceramic matrix composites play an increasingly important role in complex systems for structural, electronic, magnetic, and optical applications. This trend is expected to continue along with a specific goal to tailor composites that display spatial resolution in the micrometer and nanometer range. The fabrication techniques being used range from consolidation of submicron-sized powders to vapor phase deposition. The objective of this symposium was to review the progress made in the field and to identify the remaining critical issues to be solved through innovative processing approaches to improve the properties and reliability of advanced ceramics. In addition, this symposium was intended to complement the series of MRS symposia on Better Ceramics Through Chemistry from a physics and engineering point of view: powder synthesis and colloidial processing; sol-gel processing and ceramic/polymer composites; sol-gel processing of thin films and electronic ceramics; plasma-assisted processing and novel composites; fiber and whisker-reinforced composits. (ttl)

DESCRIPTORS: (U) *SYMPOSIA, .

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F.

AD-A229 587

AD-A229 586 20/2 9/1

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Growth, Characterization and Properties of Ultrathin Magnetic Films and Multilayers. Materials Research Society Symposium Proceedings. Volume 151.

DESCRIPTIVE NOTE: Final rept. 2 May 89-1 May 90,

MAY 90 318P

PERSONAL AUTHORS: Ballance, Joan B.; jonker, Berend T.; Heremans, Joseph P.; Marinaro, Ernesto L.

CONTRACT NO. AFOSR-89-0388

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-90-1060

UNCLASSIFIED REPORT

ABSTRACT: (U) This symposium comprised 11 invited talks and 42 contributed papers, ran over 3 1/2 days, and provided a unique and interactive forum in which recent advances in low dimensional magnetism, diluted magnetic semiconductors, epitaxial overlayers and the utilization of in-situ and ex-situ techniques to characterized their microstructure, electronic and magnetic properties were discussed. The study and growth of ultrathin magnetic structures is a rapidly expanding filed of materials research whose growth is synergistically driven by an increasing appreciation of the degree to which the magnetic properties depend on interfacial processes, and by the utilization of growth techniques which permit the fabrication of multilayer structures with novel electronic and magnetic properties. Equally important is the fact that atomic level control of the microstructure of these layers offers new opportunities to elucidate the physics of magnetism and to rigorously test theoretical models. (TTL)

DESCRIPTORS: (U) , SYMPOSIA.

IDENTIFIERS: (U) WUAFOSR2305C1, PE61102F.

AD-A229 586

AD-A229 585 9/1

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Chemistry and Defects in Semiconductor Heterostructures. Materials Research Society Symposium Proceedings. Volume 148.

DESCRIPTIVE NOTE: Final rept. 2 May 89-1 May 90,

MAY 90 483P

PERSONAL AUTHORS: Ballance, Joan B.; Kawabe, Mitsuo; Sands, Timothy D.; Weber, Eicke R.; Williams, R. S.

CONTRACT NO. AFOSR-89-0388

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-90-1053

UNCLASSIFIED REPORT

ABSTRACT: (U) The intention of the editors was to bring together an interdisciplinary and international group of researchers working on various aspects of semiconductor heterostructures so that we could all learn from each other. In particular, we hoped to forge new links between those who study chemical interactions at heterostructure interfaces and those who are concerned with the effects of interfacial defects on the electrical and optical properties of semiconductor structures. The fact that there must be some relationship between chemical reactivity and defect formation has long been recognized, but as yet there is no detailed understanding of the actual mechanisms involved. Scientists studying either the causes or the effects of interfacial defects must appreciate all the issues and work closely with each other. Only through such collaboration can the formation of semiconductor interfaces be truly understood and, enventually, their properties controlled. If this Symposium and the resulting book have stimulated only a few such interactions, then we feel that our efforts have been successful. (TTL)

DESCRIPTORS: (U) *SEMICONDUCTORS, CHEMICAL REACTIONS, CHEMISTRY, DEFECTS(MATERIALS), ELECTRICAL PROPERTIES,

AD-A229 585 CONTINUED

INTERACTIONS, INTERFACES, INTERNATIONAL, OPTICAL PROPERTIES, REACTIVITIES, STRUCTURES, SYMPOSIA.

IDENTIFIERS: (U) WUAFOSR2305C1, PE61102F.

AD-A229 527 12/1 22/2

OKLAHOMA UNIV NORMAN DEPT OF MATHEMATICS

(U) Estimation of Elastic Parameters in Linear and Nonlinear Distributed Models of Plates Arising in Large Flexible Space Structures.

DESCRIPTIVE NOTE: Final rept. 30 Sep 87-29 Oct 90,

OCT 90 26P

PERSONAL AUTHORS: White, Luther W.

CONTRACT NO. AFOSR-87-0368

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1158, WRDC

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period covered by the grant over 20 research articles were written. Titles include: Identification of Cauchy Data in Nonlinear First Order Hyperbolic Systems, Control of Certain Dynamic Models of Beams and Plates, Identification of Elastic Parameters in von Karman Plate Models, and Identification of a Coefficient of Conductivity from Potential Measurements.

DESCRIPTORS: (U) *ELASTIC PROPERTIES, *FLEXIBLE STRUCTURES, *LINEARITY, *NONLINEAR SYSTEMS, *SPACECRAFT, CAUCHY PROBLEM, COEFFICIENTS, CONDUCTIVITY, DISTRIBUTION, ESTIMATES, IDENTIFICATION, MATHEMATICAL MODELS, MEASUREMENT, PARAMETERS.

IDENTIFIERS: (U) WUAFOSR2304A1, PE61102F.

AD-A229 527

AD-A229 486 20/5

WAYNE STATE UNIV DETROIT MI DEPT OF PHYSICS AND ASTRONOMY

(U) Theoretical Investigations of Negative Ions in a Hydrogen Source.

DESCRIPTIVE NOTE: Final rept. 1 Sep 87-31 Aug 90,

AUG 90 102P

PERSONAL AUTHORS: Wadehra, Jogindra

CONTRACT NO. AFOSR-87-0342

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-1138, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal results of the research are two-fold. First, the time-dependent behavior of electron swarms in various atomic and molecular gases were obtained using a novel numerical procedure. The electrons injected in the gaseous source excite and ionize the atoms as well as molecules and, more importantly, cause dissociation and vibrational excitation of the molecular species. Second, the cross sections and the rates of negative ion production via the process of dissociative electron attachment to various light molecules were calculated. The role played by initial rovibrational excitation of the molecule in enhancing the rates of production of negative ion beams were investigated in detail. Since the processes of dissociative attachment and vibrational excitation are complementary in nature (both proceed via the excitation of molecular hydrogen and its five isotopes were also examined. Very useful scaling law for these excitation cross sections were for vibrational excitation or deexcitation, by electron impact, of heavier isotopes of H2 from the corresponding sections for molecular hydrogen. Keywords: Atomic, Molecular, Gases, Electron, Isotopes. (JHD)

DESCRIPTORS: (U) *ANIONS, *ION SOURCES, *HYDROGEN, CROSS SECTIONS, DISSOCIATION, ELECTRON IMPACT SPECTRA,

AD-A229 486

AD-A229 486 CONTINUED

ELECTRONS, EXCITATION, GASES, ION BEAMS, IONIZATION, ISOTOPES, MOLECULES, NUMERICAL METHODS AND PROCEDURES, SCALING FACTOR, ELECTRONIC STATES, TIME DEPENDENCE, MOLECULAR VIBRATION.

IDENTIFIERS: (U) WUAFOSR2301A7, PE61102F.

AD-A229 480 7/3 20/5

DENVER UNIV CO DEPT OF CHEMISTRY

(U) Physical Chemistry of Energetic Nitrogen Compounds.

DESCRIPTIVE NOTE: Final rept. 1 May 87-30 Apr 90,

NOV 90 38P

PERSONAL AUTHORS: Coombe, Robert D.

CONTRACT NO. AFOSR-87-0210

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1162, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program has produced detailed information concerning the chemical behavior of halogen isocyanate, halogen amine, and halogen azide systems. These types of molecules can store considerable amounts of energy, which can be released by photolysis, chemical reaction, or energy transfer processes. In a number of the particular cases studied, the energy release was strongly constrained by angular momentum conservation rules. The data obtained from this program are relevant to the development of new laser systems, new propellants, and the understanding of combustion processes. (TTL)

DESCRIPTORS: (U) *AMINES, *CHEMICAL PROPERTIES, *ENERGETIC PROPERTIES, *HALOGENS, *NITROGEN COMPOUNDS, ANGULAR MOMENTUM, AZIDES, CHEMICAL REACTIONS, COMBUSTION, CONSERVATION, ENERGY TRANSFER, ISOCYANATES, LASERS, MOLECULES, PHOTOLYSIS, PHYSICAL CHEMISTRY, PROPELLANTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, Halogen Isocyanate, Halogen Amine, Halogen Azide.

AD-A229 474 22/1 12/1

BOSTON UNIV MA COLL OF ENGINEERING

(U) The Nonlinear Control Theory of Complex Mechanical Systems.

DESCRIPTIVE NOTE: Final rept.,

OCT 90 59P

PERSONAL AUTHORS: Baillieu, J.; Levi, M.

CONTRACT NO. AFOSR-85-0144

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-90-1155

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes a body of research dealing with the nonlinear control theory of complex mechanical systems. The principal focus is on the dynamics of rotating systems with uncontrolled degrees of freedom, and we treat specific model problems of pointing, shape, and orientation control of complex spacecraft in a zero gravity environment. We also examine the dynamics of rotating kinematic chains. The list of references in this report cites all our major contributions to the literature of rotational mechanics. Two papers in particular-'Rotational Elastic Dynamics' and 'Equilibrium Mechanics of Rotating Systems' form the principal basis for the present report. Indeed, these papers are reproduced here with occasional remarks and comments inserted regarding very recent developments in the field. Keywords: Space structures, Aerospace, Engineering, Mathematical theory. (Author) (KR)

DESCRIPTORS: (U) *CONTROL THEORY, *NONLINEAR SYSTEMS, *ROTATION, CHAINS, CONTROL, DEGREES OF FREEDOM, DOCUMENTS, DYNAMICS, ENVIRONMENTS, EQUILIBRIUM(GENERAL), KINEMATICS, MATHEMATICS, MECHANICAL COMPONENTS, MECHANICS, MODELS, ORIENTATION(DIRECTION), SPACECRAFT, THEORY, WEIGHTLESSNESS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A229 474

AD-A229 472 20/1 12/9

WISCONSIN UNIV-MILWAUKEE DEPT OF PSYCHOLOGY

(U) Mechanisms Mediating the Perception of Complex Acoustic Patterns.

DESCRIPTIVE NOTE: Annual progress rept. 1 Nov 89-30 Sep 90,

NOV 90 106P

PERSONAL AUTHORS: Warren, Richard M.

CONTRACT NO. AFOSR-88-0320

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-1163, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Five studies were completed: (1) It was found that, following repetition, long period (500 ms) random waveforms excised from Gaussian noise could be identified when embedded in longer segments of Gaussian noise even when the inter-stimulus interval exceeded the limits of echoic memory; (2) It was demonstrated that some spectral regions of these long-period random waveforms could be recognized with greater accuracy than others; (3) Experiments with three consecutive odd-numbered harmonics demonstrated that triads with low harmonic numbers have a pitch corresponding to the fundamental of the harmonic series, but triads centered at the 9th or 11th harmonic had pitches roughly one octave higher. Deviations from the octave were consistent with the waveform pseudoperiodicities. These pitch judgements have implications for theories concerning the bases from the dominant region of complex tones. Two series of experiments involving (4) the vowel conversion effect and (5) dichotic verbal transformations, which compared the rules governing perceptual organization of speech in Japanese and English, were carried out by the principal investigator during May and June at the Basic Research Laboratories of the Nippon Telegraph and Telephone Co., Tokyo. Keywords: Auditory perception, Complex sounds. (RH)

AD-A229 472

AD-A229 472 CONTINUED

DESCRIPTORS: (U) *ACOUSTICS, *GAUSSIAN NOISE, ACCURACY, AUDIO TONES, AUDITORY PERCEPTION, CONVERSION, HARMONICS, JUDGEMENT(PSYCHOLOGY), LABORATORIES, LONG RANGE(TIME), NUMBERS, PATTERNS, PERCEPTION, REGIONS, RESEARCH FACILITIES, SOUND, SPECTRA, SPEECH, TRANSFORMATIONS, VERBAL BEHAVIOR, VOWELS, WAVEFORMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A6.

AD-A229 469 20/3 12/1 20/9

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF MATHEMATICS

(U) Nonlinear Stability in Fluids and Plasma Dynamics-Conformal Quasi-Conformal Geometry: Iteration, Distoration, Dynamics and Circle Packing.

DESCRIPTIVE NOTE: Final rept. 15 Aug 87-29 Sep 90,

OCT 90 11P

PERSONAL AUTHORS: Rodin, Burt; Freedman, Michael; Levine, Herbert; Arbarbanel, Henry

CONTRACT NO. F49620-87-C-0117

PROJECT NO. 6241

TASK NO. 00

MONITOR: AFOSR, XF
TR-90-1157, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Contents: A note on topology and magnetic energy in incompressible perfectly conducting fluids; Links of tori and the energy of incompressible flows; Factoring the logarithmic spiral; A remark on inherent differentiability; A power law for the distortion of planar sets; Strange actions of groups on spheres; Solving Beltrami equations by circle packing; An estimate for hexagonal circle packings; The convergence of circle packings to the Riemann mapping; Schwarz's lemma for circle packings; An extremal region for harmonic measure; Schwarz's lemma for circle packings, II; On Thurston's proof of Andreev's theorem; An inverse problem for circle packing approximations to the Riemann mapping function; Circle packing and conformal mapping; Circle packing and Riemann surfaces; On a problem of A. Beardon and K. Stephenson; Canonical conformal mapping for a multiply connected domain by Thurstons's circle packing method. (JHD)

DESCRIPTORS: (U) *ELECTRIC FIELDS, *CONFORMAL MAPPING, *PLASMAS(PHYSICS), APPROXIMATION(MATHEMATICS), CIRCLES, CONVERGENCE, DISTORTION, DYNAMICS, ENERGY, ENERGY TRANSFER, FLUIDS, FUNCTIONS, HARMONICS, INCOMPRESSIBLE FLOW, INVERSION, MAGNETIC FIELDS, MEASUREMENT, NONLINEAR

AD-A229 469 CONTINUED

SYSTEMS, PLANAR STRUCTURES, POWER, SPHERES, STABILITY, TOPOLOGY.

IDENTIFIERS: (U) PE61101E, WUAFOSR624100, Beltram Equations, Riemann Mapping, Schwarz Lemma, Andrew Theorem, Circle Packings.

AD-A229 435 20/4 1/3

WASHINGTON UNIV SEATTLE DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Turbulent Mixing in Exponential Transverse Jets.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 90,

SEP 90 15P

PERSONAL AUTHORS: Breidenthal, Robert E.

CONTRACT NO. AFOSR-87-0366

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1119, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The effects of acceleration on vortex growth and molecular mixing have been systematically explored for the first time in a transverse array of exponentially increasing jets. The issue is the influence of a new kind of forcing which imposes on a vortex a time scale from an exponential rather than a sinusoidal wave. The results are that such forcing dramatically reduces the normalized size of the vortex. Therefore the capacity for mixed fluid inside the vortex is also reduced, by about a factor of eight at large acceleration. Keywords: Transverse jets, Turbulent mixing, Accelerating flows. (SDW)

DESCRIPTORS: (U) *TURBULENT FLOW, ACCELERATION, ARRAYS, FLUIDS, GROWTH(GENERAL), MIXING, MOLECULES, SCALE, TIME, TRANSVERSE, VORTICES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A229 434 12/2

NEW HAMPSHIRE UNIV DURHAM DEPT OF PHYSICS

(U) Chaos in Classical Nonlinear Fields.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 88-31 Dec 89,

MAY 90 14P

PERSONAL AUTHORS: Shepard, Harvey K.; Meredith, Dawn C.

CONTRACT NO. AFOSR-88-0253

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1122, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Chaotic behavior is studied in a high-dimensional periodic lattice version of the classical Hamiltonian phi-four field theory. Both single and double well potentials were considered. Examined is the existence of a global stochasticity threshold that varied with energy and initial conditions. The model was discretized using an algorithm due to Hirota that guarantees stability and energy conservation. Chaotic behavior was diagnosed using the Lyapunov exponent, with additional information from space-time profiles, Fourier power spectra, and phase space plots. Long time scales made it difficult to distinguish between asymptotically chaotic and integrable behavior. (jhd)

DESCRIPTORS: (U) *LATTICE DYNAMICS, ALGORITHMS, ENERGY CONSERVATION, FOURIER ANALYSIS, HAMILTONIAN FUNCTIONS, LONG RANGE(TIME), LYAPUNOV FUNCTIONS, NONLINEAR SYSTEMS, POWER SPECTRA, SCALE, STABILITY.

IDENTIFIERS: (U) Chaos, PE61102F, WUAFOSR2304A4.

AD-A229 433 12/2

NEBRASKA UNIV LINCOLN DEPT OF MATHEMATICS AND STATISTICS

(U) Feedback Control in Distributed Parameter Systems.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 90,

SEP 90 5P

PERSONAL AUTHORS: Rebarber, Richard

CONTRACT NO. AFOSR-88-0230

MONITOR: AFOSR, XF
TR-90-1120, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In this project questions related to stabilization of vibrating system by feedback were studied. A vibrating system is uniformly stabilized by a feedback if there is a uniform rate of decay for all vibrational modes of the closed-loop system, which is the system with feedback. Necessary conditions were found for certain kinds of feedback to uniformly stabilize a system which is originally undamped and has the feedback applied at the boundary. Sufficient conditions were found for the feedback to lead to a closed-loop system which is mathematically well-posed. It was also shown that in a large class of systems which are stabilized by feedback, if a small delay is introduced in the computation of the feedback, then the stability of the closed-loop system is destroyed. Keywords: Robust stabilization. (KR)

DESCRIPTORS: (U) *CLOSED LOOP SYSTEMS, *FEEDBACK, *STABILIZATION, COMPUTATIONS, CONTROL, DECAY, DELAY, DISTRIBUTION, PARAMETERS, RATES, VIBRATION.

AD-A229 432 12/7 12/1 12/5

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF COMPUTER SCIENCE

(U) A Complexity Theory of Neural Networks.

DESCRIPTIVE NOTE: Annual technical rept. 15 Mar 89-14 Mar 90,

APR 90 15P

PERSONAL AUTHORS: Parberry, Ian; Berman, Piotr; Schnitger, Georg

CONTRACT NO. AFOSR-87-0400

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-1121, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Significant results have been obtained on the computation complexity of analog neural networks, and distribute voting. The computing power and learning algorithms for limited precision analog neural networks have been investigated. Lower bounds for constant depth, polynomial size analog neural networks, and a limited version of discrete neural networks have been obtained. The work on distributed voting has important applications for distributed computation in the presence of faults, and the management of replicated databases. Keywords: Neural networks, Complexity theory, Fault tolerance, Learning. (RH)

DESCRIPTORS: (U) *ALGORITHMS, *ANALOG SYSTEMS, *FAULT TOLERANCE, *NEURAL NETS, COMPUTATIONS, DATA BASES, DEPTH, DISTRIBUTION, LEARNING, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B3.

AD-A229 403 20/11

LABORATOIRE DE MECANIQUE ET TECHNOLOGIE CACHAN (FRANCE)

(U) Micromechanics of Fatigue.

DESCRIPTIVE NOTE: Final rept. 15 Mar 89-14 Mar 90,

MAY 90 27P

PERSONAL AUTHORS: Lemaitre, Jean; Billardon, Rene

CONTRACT NO. AFOSR89-0329

PROJECT NO. 2301

TASK NO. D1

MONITOR: AFOSR, XF
TR-90-1128, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Brittle and ductile isotropic damage mechanisms are studied from a meso-mechanical view point. Relationships between crack density and void volume fraction defined at meso-scale on one hand, and a scaler internal variable characterizing damage on the other hand, are given. A general form for the evolution law for this damage variable is also derived from the same approach. A threshold which defines the onset of this evolution is derived from thermodynamical considerations. The ultimate stage of this evolution, i.e., the local failure is derived from localization criteria. (JS)

DESCRIPTORS: (U) *FATIGUE, *MECHANICS, CRACKS, DENSITY, EVOLUTION(GENERAL), FAILURE, VOIDS, CRACKS, DENSITY, EVOLUTION(GENERAL), FAILURE, FATIGUE, MECHANICS, VOIDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301D1.

AD-A229 401 5/8 12/9

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF BRAIN AND COGNITIVE SCIENCES

(U) Representations in Mental Models.

DESCRIPTIVE NOTE: Final technical rept.,

SEP 90 34P

PERSONAL AUTHORS: Richards, Whitman

CONTRACT NO. AFOSR90-0177

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1127, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) On March 12-13 an interdisciplinary group of thirty-five, composed of computer scientists, experimental psychologists, linguists, philosophers and connectionists met to share views on representations and their role in mental models. Although at least two books and several papers directly address these issues, the nature of mental models is far from clear. The meeting shed some light on why understanding mental models is difficult. Simply, put, the reason is that mental processes are described in many different ways and a quite different levels of abstraction, depending upon the researcher. For example, some emphasize the cognitive properties of mental models, whereas others are more concerned with the internal data structures. Still others may stress the logical form and content of the mental process, as constrasted with the actual computational machinery. The diversity of these viewpoints is clear upon reading the abstracts prepared by the participants. Further study is needed to examine how these diverse viewpoints fit together into a useful, integrated framework. Keywords: Artificial intelligence, Cognition, Data structure, Knowledge representation, Language, Mental models, Neural nets, Perception, Reasoning. (KR)

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, *MENTAL ABILITY, *MODELS, BOOKS, COGNITION, COMPUTATIONS,

AD-A229 401 CONTINUED

COMPUTER PERSONNEL, DATA BASES, INTERNAL, LINGUISTICS, MACHINES, NEURAL NETS, PERCEPTION, PHILOSOPHY, PSYCHOLOGISTS, REASONING, SCIENTISTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4, Knowledge representation.

AD-A229 398 20/3

WAVE PRO INC RADNOR PA

(U) Pulse Propagation in Temporally Dispersive Media.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 89,

SEP 90 6P

PERSONAL AUTHORS: Kriegsmann, Gregory A.

CONTRACT NO. F49620-88-C-0094

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1076, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) By solving the transport equations for the amplitude of the progressing wave expansion of Maxwell's equations using the Lorentz model, the amplitudes, do not decay exponentially along the ray. Thus, one now studies more general models of the dispersive media, to determine the qualitative features for which the amplitudes do, or do not decay exponentially. Preliminary results suggest that a classification of dispersive media is obtained depending on the relative orders of the differential operators.(jhd)

DESCRIPTORS: (U) *MAXWELLS EQUATIONS, *TRANSPORT PROPERTIES, CLASSIFICATION, DISPERSIONS, EXPANSION, LORENTZ FORCE, MEDIA, MATHEMATICAL MODELS, PROPAGATION, PULSES, WAVE EQUATIONS.

IDENTIFIERS: (U) WUAFOSR2304A4, PE61102F.

AD-A229 262 12/3

CALIFORNIA UNIV DAVIS

(U) Reliability Modeling and Inference for Coherent Systems Subject to Aging, Shock or Repair.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 90,

AUG 90 14P

PERSONAL AUTHORS: Samaniego, Francisco J.

CONTRACT NO. AFOSR-88-0308

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1107, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report on grant AFOSR 88-0308 describes research accomplished during the period August 1, 1988-July, 1990 by Principal Investigator F.J. Samaniego and his collaborators under grant support. The results obtained in 8 completed manuscripts and two manuscripts in preparation are summarized. This research includes contributions to (i) product moment computation for multivariate survival functions (ii) parametric and nonparametric estimation in reliability (iii) the foundations of statistical estimation theory and (iv) nonstandard sampling techniques in life testing experiments. (kr)

DESCRIPTORS: (U) *STATISTICAL INFERENCE, *STATISTICAL TESTS, *MATHEMATICAL MODELS, COHERENCE, COMPUTATIONS, DOCUMENTS, ESTIMATES, LIFE TESTS, SHOCK, MOMENTS, MULTIVARIATE ANALYSIS, NONPARAMETRIC STATISTICS, PARAMETRIC ANALYSIS, RELIABILITY, REPAIR, STATISTICS, SURVIVAL(GENERAL), THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A229 244 9/5

INTELLISYS CORP ALBUQUERQUE NM

(U) Development of a High-Imaging Speed SEM for Dynamically Loaded Materials.

DESCRIPTIVE NOTE: Final rept. Oct 88-Oct 90,

OCT 90 60P

PERSONAL AUTHORS: Fishbine, B. H.; Macy, R. J.; Ross, T. J.; Wang, M. L.

CONTRACT NO. F49620-89-C-0013

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-90-1144

UNCLASSIFIED REPORT

ABSTRACT: (U) During this research effort, the concept of using a high-speed scanning electron microscope (SEM) observer real-time microstructural response of dynamically loaded structural materials was verified experimentally at a maximum framing rate of 381 Hz (256 horizontal pixels x 128 vertical pixels), about order of magnitude higher than previously possible with conventional SEM's. This experiment accomplishment proved the soundness of several key concepts: (1) That a tungsten hairpin cathode is bright enough to obtain useful digital images at the framing rate listed above; (2) that a secondary electronic detector can be built and operated at high enough count rates to obtain such images; (3) that the scan can assembly standard on an ISI SX-40A SEM can be replaced to allow imaging at such rates with spat resolution approaching 100nm; (4) that signal acquisition and scan generation can be synchronized obtain a succession of well-defined frames i n a 'movie' format at pixel rates far in excess of convention TV-rate SEM video bandwidths; and (5) that a magnetically-induced stress wave device can be used obtain dynamic fracture within the SEM chamber and field of view, with scanning timed to coincide with fracture. Also documented herein are unanticipated results which occurred during the research period. (ttl)

AD-A229 244 CONTINUED

DESCRIPTORS: (U) *ELECTRONIC SCANNERS, *IMAGES, *SCANNING, *VIDEO SIGNALS, ACQUISITION, ASSEMBLY, BANDWIDTH, CONSTRUCTION MATERIALS, COUNTING METHODS, DETECTORS, DIGITAL SYSTEMS, DYNAMICS, ELECTRONICS, FORMATS, FRACTURE(MECHANICS), FRAMES, HIGH RATE, MATERIALS, MICROSCOPES, MICROSTRUCTURE, MOTION PICTURES, OBSERVERS, RATES, REAL TIME, RESPONSE, SECONDARY, SIGNALS, TUNGSTEN.

IDENTIFIERS: (U) SEM(Scanning Electron Microscope).

AD-A229 206 11/6.2

NEW YORK STATE COLL OF CERAMICS ALFRED

(U) Group International Travel to World Round Table Conference on Sintering (7th).

DESCRIPTIVE NOTE: Final rept. Aug 89-Sep 90,

SEP 90 7P

PERSONAL AUTHORS: Spriggs, Richard N.

CONTRACT NO. AFOSR89-0428

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-89-1126, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) An objective of the Conference and related Topical Symposia has been to bring together scientists, worldwide, who work in various fields of the science and technology of sintering and sintered materials. These conferences typically attract about 200 participants from 25 or more countries of the world. Such conferences represent the premier forum for discussions of all aspects of the science of sintering and have historically attracted most of the leading scientists and a significant number of younger sintering scientists. The International Program Committee for the VIIth Conference, for example, had leading sintering scientists from 23 countries, including six from the U.S. (R.L. Coble, R.M. German, D.L. Johnson, G.C. Kuczynski, H. Palmour III, and R.M. Spriggs as President of the Committee). Given its location in Yugoslavia, the Conference has also provided an unusual opportunity for international interactions. (ttl)

DESCRIPTORS: (U) *SYMPOSIA, .

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

AD-A229 200 9/1

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Interfaces in Composites. Volume 170. Materials Research Society Symposium Proceedings Held in Boston, Massachusetts on 27-29 November 1989.

DESCRIPTIVE NOTE: Final rept 22 Nov 89-21 Nov 90,

NOV 90 379P

PERSONAL AUTHORS: Ballance, John

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-90-1056

UNCLASSIFIED REPORT

ABSTRACT: (U) Conference Was Held On The Following Area. In Situ Patterning: Selective Area Deposition and Etching, Properties of II-VI Semiconductors: Bulk Crystals, Expitaxial Films, Quantum Well Structures, and Dilute Magnetic Systems; Impurities, Defects and Diffusion in Semiconductors: Bulk and Layered Structures, Chemical Vapor Deposition of Refractory Metals and Ceramics, and Tailored Interfaces in Composite Materials. (JS)

DESCRIPTORS: (U) , CERAMIC MATERIALS, CHEMICAL REACTIONS, COMPOSITE MATERIALS, CRYSTALS, DEPOSITION, DILUTION, ETCHING, GROUP II-VI COMPOUNDS, IMPURITIES, LAYERS, MAGNETIC DEVICES, QUANTUM ELECTRONICS, REFRACTORY METALS, SEMICONDUCTORS, STRUCTURES, VAPOR DEPOSITION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A229 199 7/6

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Polymer Based Molecular Composites. Volume 171. Materials Research Society Symposium Proceedings Held in Boston, Massachusetts on 27-30 November 1989.

DESCRIPTIVE NOTE: Final rept. 26 Nov 89-25 Nov 90,

SEP 90 463P

PERSONAL AUTHORS: Schaefer, Dale W.; Mark, James E.

CONTRACT NO. AFOSR-90-0089

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-90-1054

UNCLASSIFIED REPORT

ABSTRACT: (U) A symposium entitled 'Polymer Based Molecular Composites' was organized as part of the Materials Research Society Fall Meeting Held November 27-30, 1989 in Boston, Massachusetts. A total of 57 papers were presented during the symposium. The papers were arranged in the following eight categories: (1) Inorganics/Emulsions; (2) Emulsions/Blocks; (3) Rigid-Flexible Systems; (4) Blends/IPN's; (5) Ionomers/Structure; (6) Synthesis/Electrooptical Properties; (7) Interfaces/Mechanical Properties; (8) Miscellaneous/Conventional Composites. Two papers were recognized by the symposium organizers with awards as outstanding contributed papers. Two other papers in the symposium were recognized by the Materials Research Society with Graduate Student Awards to their presenters. (JS)

DESCRIPTORS: (U) *POLYMERS, AWARDS, COMPOSITE MATERIALS, ELECTROOPTICS, EMULSIONS, FLEXIBLE MATERIALS, INORGANIC MATERIALS, INTERFACES, IONOMERS, MASSACHUSETTS, MATERIALS, MECHANICAL PROPERTIES, MOLECULES, RIGIDITY, SOCIETIES, STUDENTS, SYMPOSIA, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A229 196 7/3

HAMPTON UNIV VA DEPT OF PHYSICS

(U) (DRUIP) Nozzle Beam Deposited Diamondlike Carbon Films.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-30 Nov 89,

NOV 89 23P

PERSONAL AUTHORS: Lowe, Calvin W.

CONTRACT NO. AFOSR-89-0196

PROJECT NO. 3842

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-1135, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) It was attempted to deposit hard carbon films using the ionized cluster beam deposition method with organic materials. The principle idea was to have the organic molecules to decompose on impact with the substrate. A major problem involved the decomposition of organic starting material in the crucible. It was hoped to use lower crucible temperatures to reduce decomposition. Increased crucible temperatures were eventually used to increase the deposition rate. This resulted in more hydrogen in the chamber and the 50 I/s turbomolecular pump was unable to maintain a pressure below about 8 x 10-4 torr. Changes and experiments are being made, but to date the endeavor has been unsuccessful. Ion composition, Deposition beam, Organic chemistry. (JS)

DESCRIPTORS: (U) *ORGANIC MATERIALS, CARBON, CHEMICAL COMPOSITION, CRUCIBLES, DECOMPOSITION, DEPOSITION, DEPOSITS, FILMS, HYDROGEN, IONS, LOW TEMPERATURE, MOLECULES, NOZZLES, ORGANIC CHEMISTRY, ORGANIC COMPOUNDS, RATES, STARTING, SUBSTRATES, TEMPERATURE.

IDENTIFIERS: (U) PE61104D, WUAFOSR3842A6.

AD-A229 195 9/5

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) Computational Complexity and Efficiency in Electro-Optical Computing Systems.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 89-26 Jun 90,

JUN 90 38P

PERSONAL AUTHORS: Reif, John H.

CONTRACT NO. AFOSR-87-0386

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1080, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Research Approach and Objectives were to: To develop robust theoretical model for a wide class of electro-optical systems; to extend the known capabilities, by design of new, more efficient algorithms for electro-optical computing using less time, volume, and energy. In particular, to develop efficient algorithms that use optimal combinations of time, volume, and energy on electro-optical computing systems; and to determine the fundamental theoretical limitations and capabilities of electro-optical computing systems. In particular, to détermine lower bounds on tradeoffs between volume, time and other resources (such as energy) of any electro-optical computing systems to solve fundamental problems. (KR)

DESCRIPTORS: (U) *ELECTROOPTICS, *COMPUTERS, *OPTICAL PROCESSING, *TRADE OFF ANALYSIS, ALGORITHMS, COMPUTATIONS, EFFICIENCY, LIMITATIONS, MODELS, OPTIMIZATION, THEORY, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1.

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AD-A229 164 12/4 13/13

TEXAS A AND M RESEARCH FOUNDATION COLLEGE STATION

(U) Novel Dynamics and Controls Analysis Methods for Nonlinear Structural Systems.

DESCRIPTIVE NOTE: Interim rept. 1 Jul 89-31 Jul 90,

AUG 90 120P

PERSONAL AUTHORS: Junkins, J. L.; Kurdila, A. J.; Rahman, Z. H.

CONTRACT NO. F49620-89-C-0084

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1077, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Significant progress is reported on analytical and computational methodology applicable to dynamics and control of flexible multibody structures. Especially significant are the following: (1) We have developed new analytical and numerical results pertaining to imposing constraints in multi-body dynamical modeling and numerical simulation. We have developed an extension of existing penalty methods for constrained multibody dynamics, including some significant convergence proofs. (2) We have developed a power principle which permits the efficient construction of stabilizing control laws for systems described by nonlinear systems of coupled ordinary and partial differential equations. (3) We have initiated a study of symbol manipulation methods to derive polynomial-type nonlinear feedback control laws for dynamical systems with polynomial nonlinearities. A general MACSYMA symbolic computer code has been developed and studies are under way on several test problems. Keywords: Maneuvers, Variation, Control. (kr)

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, *STRUCTURAL ANALYSIS, *NONLINEAR SYSTEMS, BODIES, COMPUTATIONS, COMPUTER PROGRAMS, CONSTRUCTION, CONTROL, CONTROL THEORY, CONVERGENCE, DYNAMICS, EFFICIENCY, MATHEMATICAL MODELS, METHODOLOGY, NUMERICAL ANALYSIS, PARTIAL DIFFERENTIAL

AD-A229 164

AD-A229 164 CONTINUED

EQUATIONS, PENALTIES, POLYNOMIALS, POWER, STABILIZATION, STRUCTURES, SYMBOLS, TEST AND EVALUATION.

IDENTIFIERS: (U) WUAFOSR2302B1, PE61102F.

AD-A229 163 22/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Propulsion Research on the Hybrid Plume Rocket.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 89-31 Jan 90,

SEP 90 28P

PERSONAL AUTHORS: Chang-Diaz, F. R.; Yang, T. F.

CONTRACT NO. AFOSR-89-0345

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1137, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The propagation of rf waves launched in the end cell and central of the tandem mirror propulsion device has been investigated both theoretically and experimentally. Theoretically, a computer code has been developed to study the wave propagation in a nonhomogeneous magnetic field. It was found that the amplitude of the wave excited in the plasma peaked while approaching the resonance, but then damped out, indicating strong absorption of the wave by the plasma. The absorption took place near the axis and midplane of the device. The experimental results confirmed the theoretical prediction of the phenomena of the resonance effect. This means that the rf power is heating the plasma in center contrary to the earlier prediction that the heating was near the edge. Therefore higher efficiency can be possible. A very important discovery of this experiment was the broadening of the ICRF Fourier spectrum in the presence of the plasma. (kr)

DESCRIPTORS: (U) *HYBRID ROCKET ENGINES, *PLUMES, *ROCKET PROPULSION, ABSORPTION, AMPLITUDE, CELLS, COMPUTER PROGRAMS, EFFICIENCY, FOURIER ANALYSIS, LAUNCHING, MATHEMATICAL PREDICTION, MIRRORS, RADIOFREQUENCY, RADIOFREQUENCY POWER, RESONANCE, SPECTRA, THEORY, WAVE PROPAGATION; WAVES.

IDENTIFIERS: (U) WUAFOSR2308A1, PE61102F.

AD-A229 143 11/4

NORTHWESTERN UNIV EVANSTON IL DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Tailored Interfaces for Metal-Matrix Composites-Fundamental Considerations.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 89-30 Sep 90,

OCT 90 61P.

PERSONAL AUTHORS: Fine, Morris E.; Weertman, Julia R.

CONTRACT NO. AFOSR-89-0043

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1151, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research is to determine the interface properties needed for successful metal matrix composites and to learn how to achieve these properties. A number of factors have been selected for the study. These are thermodynamic stability of the interface, nature of the bonding across the interface, energy and structure of the interface, and role of adsorption at the interface. A number of systems have been chosen to probe these factors; namely, Al/TiC, Al/alpha-Al2O3, Al/MgAl2O4(spinel), Al/Al3(Tix, Zr1-x), Mg/SiC, Mg/MgO, and Mg/Al2O3. Techniques for preparing all of these composites have been worked out, including mechanical alloying followed by extrusion, arc melting, and liquid metal infiltration. MMCs also were obtained from Martin Marietta and Dow. Microstructures of the resulting MMCs are presented and discussed along with preliminary studies of some of the interfaces using transmission electron microscopy. In comparison to Al/SiC, Al/TiC and Mg/SiC show no evidence of chemical reaction at the interface during processing. Al/MgAl2O4(spinel) has superior mechanical properties to Al/alpha-Al03, both prepared identically. (Author) (tr)

DESCRIPTORS: (U) *INTERFACES, *METAL MATRIX COMPOSITES, *SURFACE PROPERTIES, ADSORPTION, ARC MELTING, CHEMICAL

AD-A229 143 CONTINUED

REACTIONS, ELECTRON MICROSCOPY, EXTRUSION, INFILTRATION(FLUIDS), LIQUID METALS, MECHANICAL PROPERTIES, MICROSTRUCTURE, STABILITY, THERMODYNAMICS, TRANSMITTANCE.

IDENTIFIERS: (U) WUAFOSR2306A1, PE61102F.

AD-A229 126 5/8

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Uses of Tyrosine in Foods to Amplify Catecholamine Release.

DESCRIPTIVE NOTE: Final technical rept. 30 Mar 87-29 Mar 90,

NOV 90 6P

PERSONAL AUTHORS: Wurtman, Richard J.

CONTRACT NO. AFOSR-87-0229

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1148, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) These studies have been part of an ongoing research program on the ability to certain nutrients to affect the production of their neurotransmitter products, and thereby to affect behaviors and other brain functions (e.g., control of blood pressure). The studies have focused on the amino acid tyrosine - which is converted, in neurons or chromaffin cells, to dopamine, norepinephrine, and epinephrine. The effect of supplemental tyrosine on brian dopamine release has now been shown directly, using the new technique of in vivo microdialysis. Hemorhage, per se, has been shown to raise neuronal tyrosine levels, probably reflecting a protective mechanism to sustain blood pressure. Adenosine and the amino acid alanine have now also been shown to modulate blood pressure - and adenosine to mediate some of the fall in blood pressure caused by hemorrhage. Various dipeptides & diketopiperazines have been shown to enhance dopamine release, either by providing tyrosine or by direct actions. Keywords: Tyrosine; Nutrient; Catecholamine, Serotonin; Behavior. (jsl

DESCRIPTORS: (U) *AMINO ACIDS, ADENOSINE, ALANINES, BLOOD PRESSURE, BRAIN, CATECHOLAMINES, CONTROL, DOPAMINE, EPINEPHRINE, FOOD, FUNCTIONS, HEMORRHAGE, NERVE CELLS, NEUROTRANSMITTERS, NOREPINEPHRINE, NUTRIENTS, PRODUCTION,

AD-A229 126 CONTINUED

RELEASE, SEROTONIN, TYROSINE.

IDENTIFIERS: (U) WUAFOSR2312A, PE61102F

AD-A229 125 5/8 22/5

EMORY UNIV ATLANTA GA

(U) Conference on Affect and Flashbulb Memories.

DESCRIPTIVE NOTE: Final technical rept. Sep 89-Aug 90,

OCT 90 7P

PERSONAL AUTHORS: Winograd, Eugene; Neisser, Ulric

CONTRACT NO. AFOSR-89-0431

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1082, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A conference was held on February 2-3, 1990, in Atlanta on the Emory campus on the topic of Affect and Flashbulb Memories. Fourteen speakers presented their research or discussed research presented by other conferees. The primary focus was on flashbulb memories of the Space Shuttle Challenger explosion of January 1986. Research was reported concerning peoples memories for information related to the disaster, including memory for their personal circumstances surrounding how they heard the news as well as their memory for the facts of the event. Primary attention was given to whether a special memory mechanism underlies vivid memories, whether these memories are established immediately at the time of the event rather than in subsequent recounting, whether these memories are as accurate as is presupposed by the flashbulb metaphor, and to the relationship between affect and memory. The results of the conference will be published as an edited volume in 1991 Cambridge University Press. Keywords: Emotions; Disasters; Memory (psychology). (Author) (emk)

DESCRIPTORS: (U) *MEMORY DEVICES, EMOTIONS, EXPLOSIONS, PSYCHOLOGY, SPACE SHUTTLES, SYMPOSIA.

IDENTIFIERS: (U) Affect/memory, Emotion/memory, WUAFOSR2313A4, PE61102F.

AD-A229 125

AD-A229 124 5/8 5/9 12/5

GEORGIA UNIV RESEARCH FOUNDATION INC ATHENS

(U) The Effect on Learning of Inferences in Instructional Text.

DESCRIPTIVE NOTE: Annual technical rept., 1 Sep 89-31 Aug 90,

SEP 90 14P

PERSONAL AUTHORS: Britton, Bruce K.

CONTRACT NO. AFOSR-89-0515

PROJECT NO. 2313

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-1147, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A computational model was used to improve the learnability of an Air Force document, doubling recall and greatly improving recruits' mental representation of the content. Kintsch's computer model of reading was applied to a 1000 word Air Force text on the Air Force's role in Vietnam War. Principles of the model were used to identify 40 text locations where recruits would have to make inferences if they were to have a coherent mental representation of the text. Each location was then repaired, and the repaired text was then tested for learnability against the original text in two experiments. In experiment 1, free recall was doubled for the repaired text. In the second experiment, 120 recruits' 66-part mental representations for 12 important text concepts were measured, and compared with the mental representations of the text's author, and of 7 independent subject matter experts. The author and the experts' mental representations correlated about .80. For recruits who read the repaired text, their mental representations correlated with the author and experts about .55 = N < 0.05. But recruits who read the original text correlated with the author and experts only about . 10. These results suggest that the computational model can be used to improve the learnability of Air Force tests. Individual differences tests of inferencing

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ability were developed.

DESCRIPTORS: (U) *LEARNING, *READING, *MEMORY(PSYCHOLOGY), AIR FORCE, COHERENCE, COMPUTATIONS, COMPUTERIZED SIMULATION, DOCUMENTS, MATHEMATICAL MODELS, MENTAL ABILITY, MODELS, RECALL, RECRUITS, ROLES(BEHAVIOR), TEST AND EVALUATION, TEXTBOOKS, VIETNAM, WARFARE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A7, KINTSCH Computer Model, Inference making Ability.

AD-A229 114 12/9

IONA COLL NEW ROCHELLE NY MACHINE INTELLIGENCE INST

(U) The Development of Structure for the Representation and Manipulation of Sophisticated Knowledge in Intelligent Systems.

DESCRIPTIVE NOTE: Final rept. 1 Feb 87-31 Mar 90,

MAR 90 9P

PERSONAL AUTHORS: Yager, Ronald R.

CONTRACT NO. AFOSR-87-0126

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-1112, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The central focus of the research was the development of a unified theory for reasoning under uncertainty in knowledge base systems. In particular an effort was made to bring together the concepts of fuzziness, lack of specificity, randomness, and monotonicity, under one framework. A number of issues relating to this goal were investigated. This effort resulted in 58 submitted papers of which 49 have been published and 7 are to appear in the near future. Keywords: Aggregation operators, Multivalued variables, Integer programming, Neural nets, Fuzzy sets. (kr)

DESCRIPTORS: (U) *KNOWLEDGE BASED SYSTEMS, FUZZY SETS, INTEGER PROGRAMMING, NEURAL NETS, REASONING, UNCERTAINTY, VARIABLES.

IDENTIFIERS: (U) 34A7, PE61102F, *Knowledge representation.

AD-A229 111 6/5

DARTMOUTH MEDICAL SCHOOL HANOVER NH

(U) Multimodal Interactions in Sensory-Motor Processing.

DESCRIPTIVE NOTE: Annual technical rept. Jul 89-Jul 90,

SEP 90 91P

PERSONAL AUTHORS: Hughes, H. C.; Reuter-Lorenz, P. A.; Fendrich, R.; Nozawa, G.; Gazzaniga, M. S.

CONTRACT NO. AFOSR-89-0437

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1132, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The saccadic control system to study the selection of stimulus events according to their spatial location. The present work focuses on two factors known to influence saccade latency: the presence of a fixation stimulus and the nature of the saccade target. We report evidence which suggests that fixation point offsets facilitate pre-motor stages of saccade generation (Reuter-Lorenz) et al., in press; Appendix I). This idea, in conjunction with electrophysiological data, suggested that fixation offset might also facilitate saccades to acoustic targets. Experiment 1 confirmed this suggestion (Fendrich, et al. (in preparation)). The facilitatory effects of redundant stimulation via the visual and auditory modalities is examined in Experiment 2 (Nozawa et al., 1990). The data suggest significant neural summation, which we attribute to bimodal convergence onto individual cells though to mediate saccadic command functions. (js)

DESCRIPTORS: (U) *MULTIMODE, *STIMULI, *VISION, *PERCEPTION, CONVERGENCE, DUAL MODE, ELECTROPHYSIOLOGY, INTERACTIONS, POSITION(LOCATION), REDUNDANCY, REPORTS, SELECTION, SPATIAL DISTRIBUTION, STIMULATION(GENERAL).

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4, Visual Modalities, Auditory Modalities.

AD-A229 111

AD-A229 110 6/1

TEXAS UNIV AT EL PASO

(U) Equipment Support Grant for Air Force Task 'Chemical Defense Drugs Effects with Exercise and Thermal Stress'.

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Apr 90,

OCT 90 17P

PERSONAL AUTHORS: Elizondo, Reynaldo S.

MONITOR: AFOSR, XF
TR-90-1086, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The effects of a single intramuscular atropine injection (0.03 mg/kg) at ambient temperatures (Ta) of 25 C and 35 C and pyridostigmine treatment (5 doses (0.4 mg/kg)) at Ta of 35 C on the thermoregulatory capacity and exercise tolerance time of patas monkeys were investigated. A primate treadmill device was developed and used to evaluate the effects of the drugs on the exercise tolerance time. Rectal temperature (Tre) and heart rate (HR) were continuously monitored by a telemetry system while water loss was estimated from weight differences before and after exercise. Atropine effects were more pronounced at Ta of 35 C as indicated by a significant reduction in water loss (43%) which was associated with an average exercise time of 65 min less than the control value. The final HR and Tre responses in these atropine experiments were significantly elevated above the control values. Pyridostigmine significantly increased water loss (61%) which was associated with an average exercise time of 60 min longer than the control value. (js)

DESCRIPTORS: (U) *DRUGS, *INTRAMUSCULAR INJECTIONS, ATROPINE, BODY TEMPERATURE, CONTROL, EXERCISE(PHYSIOLOGY), HEART RATE, LOSSES, MONKEYS, PRIMATES, RECTUM, TELEMETER SYSTEMS, TEMPERATURE, THERMAL STRESSES, TIME, TOLERANCES(PHYSIOLOGY), TREADMILLS, VALUE, WATER.

AD-A229 110

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A229 105 6/5

EAST CAROLINA UNIV SCHOOL OF MEDICINE GREENVILLE NC

(U) Presynaptic Modulation of the Hippocampal Mossy Fiber Synapse.

DESCRIPTIVE NOTE: Annual rept. 15 Sep 89-14 Sep 90,

SEP 90 11P

PERSONAL AUTHORS: Terrian, David M.

CONTRACT NO. AFOSR-89-0531

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1098, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall goal of this research project is to systematically investigate a number of the possible through which presynaptic modulation might influence the effectiveness of local synaptic interactions at the mammalian hippocampal mossy fiber synapse. The potential significance of this research has been dramatically highlighted by the events of this past year, in which several different laboratories conclusively demonstrated that long-term potentiation (LTP) in the mossy fiber-CA3 synapse involves an enhancement of neurotransmitter release (Bekkers et al., 1990; Malinow and Tsien, 1990; Staubli et al., 1990; Zalutsky and Nicoll, 1990). The LTP of synaptic transmission in the hippocampus is a widely studied model system for understanding the cellular mechanisms of memory and synaptic plasticity. Thus, a definitive link has now been established between mossy fiber synaptic plasticity and the presynaptic modulation of this synaptic input. Specifically, any factor that is capable of enhancing or suppressing the release of mossy fiber transmitters will have a predictable effect on the probability that LTP is maintained in the mossy fiber-CA3 synapse. Keywords: Presynaptic, Hippocampus, Mossy fiber, Long-term potentiation, Glutamate, Dynorphin. (js)

DESCRIPTORS: (U) *HIPPOCAMPUS, *FIBERS, *SYNAPSE, CYTOLOGY, GLUTAMIC ACID, INPUT, INTERACTIONS, MEMORY

AD-A229 105 CONTINUED

DEVICES, MODELS, NEUROTRANSMITTERS, OPTIMIZATION, PLASTIC PROPERTIES, PREDICTIONS, RELEASE, SALTS, TRANSMITTANCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2

AD-A229 085 7/2

PITTSBURGH UNIV PA

(U) Evidence for Anisotropic Vibration of Diatomic Adsorbates - NO and CO Chemisorbed on Stepped Pt(112),

FEB 90 7P

PERSONAL AUTHORS: Szabo, A.; Henderson, M. A.; Yates, J. T., Jr

CONTRACT NO. AFOSR-82-0133

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1123, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Both NO and CO preferentially chemisorb on step sites of the Pt(112) crystal orienting the intermolecular bond in the downstairs direction. Using the digital electron stimulated desorption-ion angular distribution method (ESDIAD), an elliptical angular distribution of the desorbing) + ions was detected from the MO/Pt(112) system with the longer axis of the ellipse normal to the step-edge direction. On the other hand, the)+ ESDIAD pattern from the CO/Pt(112) system shows an approximately cylindrical symmetric shape. Heating of the crystal leads to broadening of the ion desorption patterns in both cases without change in the patterns' elliptical or circular cross-sectional geometry. These results are interpreted as being due to ion desorption from NO molecules bonded to two Pt atoms on the step edge and vibrating with a longer amplitude in the vibration is approximately the same in directions parallel and perpendicular to the step edge. Thus, in certain cases ESDIAD patterns may be used to determine the hybridization state of adsorbates. (ttl)

DESCRIPTORS: (U) , REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2, ESDIAD(Electron Stimulated Desorption-Ion Angular Distribution).

AD-A229 083 12/6 23/2 12/9

COLORADO UNIV AT BOULDER DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Workshop on Optical Neural Networks Held in Jackson, Wyoming on 7-10 February 1990.

DESCRIPTIVE NOTE: Final rept. 1 Mar-30 Sep 90,

SEP 90 30P

PERSONAL AUTHORS: Wagner, Kelvin

CONTRACT NO. AFOSR-90-0176

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1150, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *FIBER OPTICS, *NETWORKS, *NEURAL NETS, ALGORITHMS, COMPUTER ARCHITECTURE, BIONICS.

IDENTIFIERS: (U) Optical neural networks, WUAFOSR2305B1.

AD-A229 082 9/1

MINNESOTA UNIV ST PAUL

(U) High Temperature Superconducting Compounds.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 87-30 Sep 90,

OCT 90 12P

PERSONAL AUTHORS: Goldman, Allen M.; Mecartney, Martha L.

CONTRACT NO. AFOSR-87-0372

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR
TR-90-1149

UNCLASSIFIED REPORT

ABSTRACT: (U) High-Tc superconductors have been investigated in both bulk and thin film form. A technique for the in-situ preparation of high-Tc superconducting films involving the use of ozone-assisted Molecular Beam Expitaxy has been developed. The procedures seem be to generalized to the extent that high quality trilayer and multilayer structures which would be useful scientifically and technologically are possible. In addition to the process working with the usual substrates, it has been possible to deposit films on Si substrates without any buffer layer. A bolometer has been sucessfully fabricated on a thermally isolated SiN substrate coated with YSZ. Very thin and transparent films with relatively high transition temperatures have been prepared. The magnetic properties of bulk polycrystalline and single crystal high temperature superconductors have been measured and reveal important features of flux pinning and anistropy in these materials. A low temperature scanning tunneling microscope for the investigation of the surfaces of high-Tc superconductors has been developed. Keywords: Superconductivity, Materials, Thin films. (js)

DESCRIPTORS: (U) *SUPERCONDUCTORS, BOLOMETERS, BUFFERS, DEPOSITS, FILMS, FLUX(RATE), HIGH TEMPERATURE, LAYERS, MAGNETIC PROPERTIES, PREPARATION, STRUCTURES, SUBSTRATES,

AD-A229 082 CONTINUED

SUPERCONDUCTIVITY, THIN FILMS, TRANSITION TEMPERATURE, TRANSPARENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306C1.

AD-A229 080 20/9

MISSION RESEARCH CORP NEWINGTON VA

(U) The DIMEX Experiment.

DESCRIPTIVE NOTE: Final rept.,

SEP 90 68P

PERSONAL AUTHORS: Brandenburg, John; Bollen, W. M.; Seeley, Robert; Nguyen, Khanh

REPORT NO. MRC/WDC-R-230

CONTRACT NO. F49620-89-C-0106

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR, XF
TR-90-1075, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) DIMEX (DIpole plasma Microwave EXposure) experiment has demonstrated both stable confinement of plasma at electron densities of the order of 10 to the 11th power and electron temperatures of 1 eV and also has demonstrated strong absorption of 1 GHz microwaves with much reduced reflection (-10dB). In addition, high-intensity microwaves (greater than 0.1 W/sq cm) were strongly reflected, indicating that the plasma shell can function as a cloak to radar and a shield to HPM. It is believed that the successful demonstration of plasma confinement, cloaking to low-intensity microwaves, and even shielding to high-intensity microwaves can be explained in terms of exiting theory, drawn from the magnetic and laser fusion communities. (JHD)

DESCRIPTORS: (U) *CONFINEMENT(GENERAL), *PLASMAS(PHYSICS), RADIATION ABSORPTION, DEMONSTRATIONS, DIPOLES, ELECTRON DENSITY, EXPOSURE(GENERAL), INTENSITY, LASER INDUCED FUSION, MICROWAVES, RADAR, REDUCTION, REFLECTION, SHELLS(STRUCTURAL FORMS), SHIELDING, STABILITY, ELECTROMAGNETIC SHIELDING.

IDENTIFIERS: (U) WUAFOSR2301A8, PE61102F, DIMEX Experiment, DIMEX(Dipole Plasma Microwave Excposure).

AD-A229 080

AD-A229 079 20/4

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Vortex Simulation of Turbulent Combustion.

DESCRIPTIVE NOTE: Annual rept. Aug 89-Sep 90,

OCT 90 10P

PERSONAL AUTHORS: Ghoniem, Ahmed F.

CONTRACT NO. AFOSR-89-0491

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1115, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This activity focused on the effect of density variation due to temperature/molecular weight difference and/or heat release in a reacting shear layer in two and three dimensional configurations. In the spatially growing 2D layer, results confirm mixing asymmetry due to density difference between the two streams. A light fast stream has a destabilization effect on the early stages of development; it promotes early roll-up; induces stronger winding inside the eddies, and initiates the pairing at earlier stages. However, the overall spatial growth rate of the layer increases as the density ratio becomes higher; bigger eddies are formed and pairing is completed faster. In 3D simulations, density difference continues to impart a convection velocity on the structures in the direction of heavy stream. That influences the evolution of the streamwise mixing modes and spanwise preferential entrainment is observed. 3D reacting shear layer simulations confirmed earlier 2D observations that although the reaction zone structure depends on the Damkohler number, product distribution is independent of the kinetic parameters and exhibit strong resemblance to the vorticity field. (JHD)

DESCRIPTORS: (U) *COMBUSTION, *TURBULENCE, *VORTICES, ASYMMETRY, CONFIGURATIONS, CONVECTION, DENSITY, GROWTH(GENERAL), HEAT, KINETICS, LAYERS, MIXING, MOLECULAR WEIGHT, PARAMETERS, RATES, RATIOS, RELEASE,

AD-A229 079

AD-A229 079 CONTINUED

SHEAR PROPERTIES, SIMULATION, SPATIAL DISTRIBUTION, TEMPERATURE, THREE DIMENSIONAL, TWO DIMENSIONAL, VARIATIONS, VELOCITY.

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F, Damkohler Number, *Turbulent Combustion.

AD-A229 072 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Synthesis of Tris(Trifluoromethyl)Gallium and Its Adducts.

DESCRIPTIVE NOTE: Journal article,

90 5P

PERSONAL AUTHORS: Guerra, M. A.; Mehritra, S. K.; Dyer, D. W.; Lagow, R. J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-1094, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry, v390 pc73-c76 1990.

ABSTRACT: (U) Tris(trifluoromethyl)gallium and its trimethylphosphine-and trimethylarsine complexes have been synthesized using the Morrison reagent. Several new materials of potential importance to the microelectronic industry have been produced.

DESCRIPTORS: (U) , REPRINTS.

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F.

AD-A229 065 6/5

WASHINGTON STATE UNIV PULLMAN COLL OF PHARMACY

(U) Xenobiotic Kinetics and Toxicity among Fish and Mammals.

DESCRIPTIVE NOTE: Final rept. 15 Sep 88-30 Jun 90,

SEP 90 10P

PERSONAL AUTHORS: Hayton, William L.

CONTRACT NO. AFOSR-88-0345

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1146, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Work was focused on paraoxon, a direct inhibitor of acetylcholisterase (AChE) and a potent toxicant on the cholinergic nervous system. While paraoxon inhibits AChE in all tissues, the tissue in which inhibition results in death is not known for certain. It is clear that death after acute paraoxon poisoning results from asphyxiation. The dose of paraoxon at cessation of breath (CoB1) average 5.7 mg/kg at all infusion rates, which suggests that the same site of action and mechanism for paraoxon-induced CoB was in effect at all infusion rates. While heart AChE activity at CoB was independent of the infusion rate, heart appeared not to be the sensitive site since it was pumping blood at CoB. A site of action consistent with the data was CNS outside the blood-brain barrier. With low infusion rate most of the total brain AChE was inhibited. With increasing infusion rate, inhibition of total brain AChE activity would decrease, due to less time for paraoxon to penetrate the BBB; the extra-BBB site would always be rapidly inhibited. Heart and diaphragm AChE was at the level observed at CoB while inhibition of brain AChE increased with increasing dose, again indicating brain as the sensitive site. (JS)

DESCRIPTORS: (U) *ACETYLCHOLINESTERASE, *INHIBITORS, *NITROPHENOLS, *PHOSPHATES, ASPHYXIATION, BARRIERS, BLOOD,

AD-A229 065 CONTINUED

BRAIN, CHOLINERGIC NERVES, DEATH, DIAPHRAGMS(MECHANICS), DOSAGE, HEART, INDICATORS, INFUSIONS, INHIBITION, INSECTICIDES, LOW RATE, MAMMALS, NERVOUS SYSTEM, POISONING, POTENCY, PUMPING, RATES, SENSITIVITY, SITES, TISSUES(BIOLOGY), TOXIC AGENTS, TOXICITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A4, Paraoxon.

AD-A229 064 20/8

OKLAHOMA UNIV NORMAN DEPT OF PHYSICS AND ASTRONOMY

(U) Resonance Energies and Widths from the Poles of the Multichannel T Matrix.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 Jul 90,

NOV 90 6P

PERSONAL AUTHORS: Watson, Deborah K.

CONTRACT NO. AFOSR-84-0379

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1145, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A multichannel iteration technique was developed to obtain accurate results for phase shifts from a 'smooth' Schwinger K matrix. Applications were made to e + He+ phase shifts in one, two, and three channel approximations. A second project was started to study excited states of helium using dimensional analysis. A moment method is being used to solve the two-electron Schrodinger equation generalized to an arbitrary number of dimensions. Keywords: Helium. (kr)

DESCRIPTORS: (U) *ITERATIONS, *MULTICHANNEL, *PHASE SHIFT, ACCURACY, APPROXIMATION(MATHEMATICS), CHANNELS, ELECTRON TRANSITIONS, ENERGY, HELIUM, METHOD OF MOMENTS, RESONANCE, SCHRODINGER EQUATION, SIZES(DIMENSIONS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4.

AD-A229 051 5/8 5/6

WISCONSIN UNIV-MADISON DEPT OF PSYCHOLOGY

(U) Comprehension of Illustrated Text: Pictures Help to Build Mental Models.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jul 89-30 Jun 90,

SEP 90 41P

PERSONAL AUTHORS: Glenberg, Arthur M.; Langston, William E.

CONTRACT NO. AFOSR-89-0367

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1083, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Pictures help people to comprehend and remember texts. We report two experiments designed to test among several accounts of this facilitation. Students read texts describing four-step procedures in which the middle steps were described as occurring at the same time, although the verbal description of the steps was sequential. A mental representation of the procedure would have the middle steps equally strongly related to the preceding and succeeding steps (because the steps are performed simultaneously), whereas a mental representation of the text would have the middle step that was described first more closely related to the preceding step than the middle step described. After reading, strengths of the represented relationships between the steps were assessed. When the texts were accompanied by appropriate pictures, subjects tended to mentally represent the procedure. When the texts were presented alone or with pictures illustrating the order in which the steps were described in the text, subjects tended to mentally represent the text. We argue that these results disconfirm motivational, repitition, and dual code explanations of the facilitative effects of pictures. The results are consistent with a version of mental model theory that proposes that pictures help to

AD-A229 051 CONTINUED

build mental models of what the text is about. Keywords: Memory psychology; Reading comprehension; Teaching methods/pictures. (Author) (emk)

DESCRIPTORS: (U) *COMPREHENSION, *MENTAL ABILITY, CODING, MEMORY(PSYCHOLOGY), MODEL THEORY, MODELS, PICTURES, READING, REPORTS, STUDENTS, TEACHING METHODS, TEXTBOOKS.

IDENTIFIERS: (U) Mental models, PE61102F, WUAFOSR2313A4.

AD-A229 047 20/4

NORTHWESTERN UNIV EVANSTON IL DEPT OF ENGINEERING SCIENCE AND APPLIED MATHEMA TICS

(U) The Stability and Dynamics of Elastic Structures and Fluid Flows.

DESCRIPTIVE NOTE: Final rept. 1 Feb 85-28 Feb 90,

SEP 90 24P

PERSONAL AUTHORS: Reiss, Edward L.

CONTRACT NO. AFOSR-85-0150

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1133, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The main thrust of our research program has been the development and applications of asymptotic and perturbation methods for analyzing: the stability and dynamics of elastic structures, fluid flow, and other nonlinear problems; and for problems of scattering of acoustic, electromagnetic and other waves. Keywords: Poiseuille flow, Channel flow, Convection (Heat transfer), Bipolar Transistors, Bipolar oscillators, Flutter, Q switching, Ring lasers, Pharmakokinetics, Control theory, Acoustic scattering, Phase transformations, Caustics, Fluid mechanics. (jhd)

DESCRIPTORS: (U) *ELASTIC PROPERTIES, *FLUID MECHANICS, *PERTURBATION THEORY, ACOUSTIC SCATTERING, BIPOLAR SYSTEMS, BIPOLAR TRANSISTORS, CAUSTICS, CHANNEL FLOW, CONTROL THEORY, CONVECTION, DYNAMICS, FLUID FLOW, FLUTTER, HEAT TRANSFER, NONLINEAR SYSTEMS, OSCILLATORS, PHASE TRANSFORMATIONS, POISEUILLE FLOW, Q SWITCHING, RING LASERS, SCATTERING.

IDENTIFIERS: (U) Hopf Bifurcation, WUAFOSR2304A4, PE61102F.

AD-A229 045 21/2 20/5

PURDUE UNIV LAFAYETTE IN

(U) Asynchronous Optical Sampling for Laser-Based Combustion Diagnostics in High-Pressure Flames.

DESCRIPTIVE NOTE: Annual technical rept. 15 Dec 88-14 Dec 89,

JAN 90 16P

PERSONAL AUTHORS: King, G. B.; Laurendeau, N. M.; Lytle, F. E.

CONTRACT NO. AFOSR-89-0051

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1141, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describe the progress on the development of a new laser based combustion diagnostic for the quantitative measurement of both major and minor species in high pressure flames. The technique, Asynchronous Optical Sampling (ASOPS), is a state of the art improvement in picosecond pump/probe spectroscopy. Final results from the study of atomic sodium in an atmospheric flame are presented. The first ever UV pump/ UV probe ASOPS signal for atomic indium is shown. Techniques for noise reduction are discussed along with initial results. Keywords: Probe spectroscopy; Combustion; Laser diagnostics; Stimulated emission. (jhd)

DESCRIPTORS: (U) *COMBUSTION, *DIAGNOSTIC EQUIPMENT, ASYNCHRONOUS SYSTEMS, EMISSION, FLAMES, HIGH PRESSURE, LASER APPLICATIONS, LASERS, MEASUREMENT, NOISE REDUCTION, OPTICAL PROPERTIES, PROBES, OPTICAL PUMPING, SAMPLING, SPECTROSCOPY, STATE OF THE ART, ULTRAVIOLET RADIATION.

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F.

AD-A229 032 12/5

UTAH STATE UNIV LOGAN

(U) Environmental Containment Property Estimation Using OSARs in an Expert System.

DESCRIPTIVE NOTE: Annual rept. 15 Aug 89-15,

SEP 90 72P

PERSONAL AUTHORS: Doucette, William J.; Stevens, David K.; Dupont, R. R.; McLean, Joan E.; Denne, Doug

CONTRACT NO. AFOSR-89-0509

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1100, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A microcomputer based Property Estimation Program (PEP) and Database (DB), utilizing molecular connectivity indices (MCI)-property and property-property correlations, as well as UNIFAC derived activity coefficients, has been designed to provide both experts and non-experts with a fast, economical method to estimate compound aqueous solubility, octanol/water partition coefficient, vapor pressure, organic carbon normalized soil sorption coefficient, BCF, and Henry's Law constant for use in environmental fate modeling. The user can input the required structural information using either Simplified Molecular Input Line Entry System (SMILES) notation or connection tables generated from two commercially available two-dimensional drawing programs, ChemDraw or ChemIntosh. Estimates of predictor accuracy are provided along with the estimated property values. The development and current status of the PEP-DB program is described. (JS)

DESCRIPTORS: (U) *DATA BASES, *ENVIRONMENTS, ACCURACY, ACTIVATION, CARBON, COEFFICIENTS, CONTAINMENT(GENERAL), ENGINEERING DRAWINGS, ESTIMATES, EXPERT SYSTEMS, LOW COSTS, ORGANIC MATERIALS, PREDICTIONS, SOILS, SOLUBILITY, SORPTION, STRUCTURAL PROPERTIES, TWO DIMENSIONAL, VALUE, VAPOR PRESSURE, WATER.

AD-A229 032 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A4.

AD-A229 031 20/3

ROCHESTER UNIV NY DEPT OF ELECTRICAL ENGINEERING

(U) Phase Sensitive Amplification with SIS Mixers.

DESCRIPTIVE NOTE: Final rept. 15 Jan 87-14 Feb 90,

FEB 90 6P

PERSONAL AUTHORS: Bocko, Mark F.

CONTRACT NO. AFOSR-87-0131

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR, XF
TR-90-1096, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *MIXERS(ELECTRONICS), QUANTUM ELECTRONICS, LOCAL OSCILLATORS, PHASE(ELECTRONICS), GUNN DIODES.

IDENTIFIERS: (U) Gunn oscillators.

AD-A229 029 20/2

CALIFORNIA UNIV SANTA BARBARA DEPT OF MATERIALS

(U) Partitioning Reactions to Control and Develop Unique Microstructures.

DESCRIPTIVE NOTE: Final rept. 15 Jun 87-15 Jun 90,

SEP 90 58P

PERSONAL AUTHORS: Lange, F. F.

REPORT NO. TR-8

CONTRACT NO. AFOSR-87-0291

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1139, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies reported include: (1) Liquid precursor formulation, pyrolysis, compositional homogeneity, and densification, (2) Crystallization vs. compostion subsequent to pyrolysis, (3) High temperature phase partitioning of metastable structures produced during crystallization after pyrolysis, (4) Grain growth phenomena as related to different binary, solid-solution cations and composition with different binary systems, (5) Microstructural instabilities of polycrystalline thin films, (6) Microstructural instabilities of polycrystalline fibers constrained by composite matrices, (7) Formation of single crystal thin films as a function of differential composition and lattice mismatch, and (8) Relations between processing flaws and strength for fibers produced by dry spinning. The pertinent results of these studies and their interrelations are summarized. (JS)

DESCRIPTORS: (U) *CRYSTALLIZATION, CATIONS, COMPOSITE MATERIALS, COMPOSITION(PROPERTY), CONTROL, DEFECTS(MATERIALS), DENSITY, FIBERS, FORMULATIONS, GRAIN GROWTH, HIGH TEMPERATURE, HOMOGENEITY, LIQUIDS, MATRIX MATERIALS, METASTABLE STATE, MICROSTRUCTURE, POLYCRYSTALLINE, PRECURSORS, PROCESSING, PYROLYSIS,

AD-A229 029 CONTINUED

SINGLE CRYSTALS, SOLID SOLUTIONS, STRUCTURES, THIN FILMS.

AD-A229 017 11/6.1

MARYLAND UNIV COLLEGE PARK DEPT OF CHEMICAL AND NUCLEAR ENGINEERING

(U) Fundamental Studies on High Temperature Deformation, Recrystallization, and Grain Growth of Two-Phase Materials.

DESCRIPTIVE NOTE: Final 1 Sep 85-30 Nov 89,

SEP 90 87P

PERSONAL AUTHORS: Ankem, S.; Grewal, G.; Vijayshankar, M. N.

CONTRACT NO. AFOSR-85-0367

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1079, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Twp - phase Materials are technologically important because optimum properties can be obtained by proper combinations of phases. Among these materials, two-phase Titanium Alloys are of particular interest for high temperature aerospace applications. To design new alloys or to optimize the properties of existing Titanium alloys, it is essential to understand the deformation behavior and microstructure evolution of alpha, alpha-beta and beta Titanium alloys which is the subject of this investigation. Another aspect of this investigation is to determine the effect of strength difference between phases on deformation behavior of two-phase materials by the Finite Element Method. It was found that the flow stress drops followed by steady state behavior observed in beta titanium alloys strongly depend on pre-strain, prior heat treatments, and amount and nature of alloying elements. The flow stress drops were attributed to the multiplication of mobile dislocations and the steady state behavior was attributed to the dynamic recovery leading to the formation of subgrains. (ttl)

DESCRIPTORS: (U) *DEFORMATION, *GRAIN GROWTH, *HIGH TEMPERATURE, *RECRYSTALLIZATION, *TITANIUM ALLOYS,

AD-A229 017 CONTINUED

AEROSPACE SYSTEMS, ALLOYS, BEHAVIOR, DISLOCATIONS, DROPS, DYNAMICS, EVOLUTION(GENERAL), FINITE ELEMENT ANALYSIS, FLOW, HEAT TREATMENT, MATERIALS, MICROSTRUCTURE, MOBILE, MULTIPLICATION, OPTIMIZATION, PHASE, PHASE STUDIES, RECOVERY, STEADY STATE, STRESSES, TWO PHASE FLOW.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1, Alpha titanium alloys, Beta titanium alloys,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A229 015 20/4

MARYLAND UNIV COLLEGE PARK DEPT OF AEROSPACE ENGINEERING

(U) *Non-Equilibrium Chemistry Effects on Hypersonic Separated Flows--Shock-Wave/Boundary-Layer Interaction.*

DESCRIPTIVE NOTE: Final rept. 1 Mar 88-28 Feb 90,

SEP 90 47P

PERSONAL AUTHORS: Anderson, John D., Jr

CONTRACT NO. AFOSR-88-0107

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1134, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This work has addressed the question: What is the effect of nonequilibrium chemical reactions on separated hypersonic flow? The model used to generate the separate flow is a hypersonic shock wave/boundary layer interaction on a flat plate in a high enthalpy flow. The flow was calculated by means of a finite-difference, time-marching solution. The results show that nonequilibrium effects can be important in the separated flow region, and that future applications should be aware of such effects. Keywords: Separated flow, Non-equilibrium, Shock-wave/boundary layer, Boundary layer interaction. (JS)

DESCRIPTORS: (U) *BOUNDARY LAYER, CHEMICAL REACTIONS, CHEMISTRY, ENTHALPY, FLOW, FLOW SEPARATION, HIGH RATE, HYPERSONIC FLOW, INTERACTIONS, NONEQUILIBRIUM FLOW, PLATES, SEPARATION, SHOCK WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A1.

AD-A229 013 11/2 20/11 12/2

ILLINOIS UNIV AT CHICAGO CIRCLE

(U) Mechanics of Concrete II.

DESCRIPTIVE NOTE: Final rept. May 88-Aug 90,

OCT 90 80P

PERSONAL AUTHORS: Krajcinovic, D.; Basista, M.; Sumarac, D.; Al-Ghaffar, M.

REPORT NO. CRR-91023

CONTRACT NO. AFOSR-88-0156

PROJECT NO. 2302

TASK NO. C2

MONITOR: AFOSR, XF
TR-90-1078, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This Report summarizes the results of a research program focused on the distress of cementitious composites exposed to aggressive chemical substances found in nature. It presents a comprehensive summary of constituent physico-chemical processes such as diffusion with adsorption, kinetics of chemical reactions, stresses attributable to expansive reaction products and attendant microcracking. Formulated analytical model was checked against available experimental data. The accuracy with which these data were duplicated is considered to be exemplary at this stage of the model development. (ttl)

DESCRIPTORS: (U) *CEMENTS, *COMPOSITE MATERIALS, *PHYSICOCHEMICAL PROPERTIES, *EXPOSURE(GENERAL), ACCURACY, ADSORPTION, CHEMICAL REACTIONS, CHEMICALS, EXPERIMENTAL DATA, KINETICS, MATHEMATICAL MODELS, MICROCRACKING, MODELS, REACTANTS(CHEMISTRY), STRESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302C2, Cementitious composites.

AD-A229 007 1/1

ARIZONA UNIV TUCSON DEPT OF AEROSPACE AND MECHANICAL ENGINEERING

(U) Computational Studies of Compressibility Effects on Dynamic Stall.

DESCRIPTIVE NOTE: Final rept. 1 Jun 88-31 Aug 90,

SEP 90 94P

PERSONAL AUTHORS: Fung, K.-Y.

CONTRACT NO. AFOSR-88-0163

PROJECT NO. 2307

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1131, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The dynamic stall characteristics of several airfoils in sinusoidal pitch oscillations as well as in constant rate pitch ramps over a wide range of unsteady flow conditions have been investigated. It is found that the flow before the onset of stall can be considered quasi-steady and predicted using inviscid theory, that the effect of unsteadiness on the onset of dynamic stall depends on the airfoil geometry and whether the flow has become locally supersonic, and that the effect of the freestream Mach number on the onset is rather insensitive to the airfoil geometry. Our analysis on both experimental and numerical results predicts the presence of a separation bubble at the leading edge. It also suggests that the bursting of the bubble, or failure to reattach after the initial separation, is the onset mechanism for most of the dynamic stall cases studied. The effects of transition on bubble bursting (the onset of massive separation of dynamic stall) are studied numerically by choosing the location at which the turbulence model is switched from molecular to turbulent eddy viscosity in the numerical code. It was found that at angles of attack close to the static stall angle, minor movements in the transition point could cause a separation bubble to burst, and that bubble bursting is more susceptible to transition point location in a

locally supersonic flow than a subsonic flow. Keywords: Pitch motion/oscillation; Flow separation; Mathematical models; Eddies fluid mechanics; Model tests. (EDC)

DESCRIPTORS: (U) *AIRFOILS, *FLOW SEPARATION, *OSCILLATION, *PITCH(MOTION), *STALLING, ANGLE OF ATTACK, BUBBLES, CODING, COMPRESSIVE PROPERTIES, COMPUTATIONS, DYNAMICS, EDDIES(FLUID MECHANICS), FREE STREAM, GEOMETRIC FORMS, INVISCID FLOW, LEADING EDGES, MACH NUMBER, MATHEMATICAL MODELS, MODEL TESTS, NUMERICAL ANALYSIS, POSITION(LOCATION), RAMPS, RANGE(EXTREMES), RATES, RUPTURE, SINE WAVES, STATICS, SUBSONIC FLOW, SUPERSONIC FLOW, THEORY, BOUNDARY LAYER TRANSITION, TURBULENCE, TURBULENT FLOW, UNSTEADY FLOW, VISCOSITY, VISCOUS FLOW.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A3, Sinusoidal oscillation, Separation bubbles, *Dynamic stall.

AD-A229 006 20/14 20/3 20/1

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG

(U) Pulse Propagation in Random Media.

DESCRIPTIVE NOTE: Final technical rept. 1 Mar 89-30 Apr 90,

JUN 90 4P

PERSONAL AUTHORS: Kohler, Werner

CONTRACT NO. AFOSR-88-0112

PROJECT NO. 6177

TASK NO. S7

MONITOR: AFOSR, XF
TR-90-1091, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes results obtained in the study of how waves are reflected and transmitted by a randomly layered medium. Temporally pulsed energy (plane wave, beam or radiated energy from a localized source) illuminates this material. Work that was initially done for the acoustic problem has been extended to the electromagnetic problem. An extensive simulation study has confirmed the applicability of this theory. Recent work has considered radiation from a monochromatic point source in the presence of a randomly layered medium. (jhd)

DESCRIPTORS: (U) *PROPAGATION, *PULSES, ACOUSTICS, ELECTROMAGNETIC PROPERTIES, ENERGY, LAYERS, MEDIA, MONOCHROMATIC LIGHT, PLANE WAVES, RADIATION, SIMULATION, SOURCES, WAVE EQUATIONS.

IDENTIFIERS: (U) WUAFOSR617757, PE62202F.

AD-A229 005 11/6.1 8/3

GEORGIA UNIV RESEARCH FOUNDATION INC ATHENS

(U) The Corrosion Behavior of Copper-Based Materials Exposed to Natural Seawater.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 89-31 Aug 90,

SEP 90 14P

PERSONAL AUTHORS: Britton, Bruce K.

CONTRACT NO. AFOSR-89-0515

PROJECT NO. 2313

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-1147, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A computational model was used to improve the learnability of an Air Force document, doubling recall and greatly improving recruits' mental representation of the content. Kintsch's computer model of reading was applied to a 1000 word Air Force text on the Air Force's role in Vietnam War. Principles of the model were used to identify 40 text locations where recruits would have to make inferences if they were to have a coherent mental representation of the text. Each location was then repaired, and the repaired text was then tested for learnability against the original text in two experiments. In experiment 1, free recall was doubled for the repaired text. In the second experiment, 120 recruits' 66-part mental representations for 12 important text concepts were measured, and compared with the mental representations of the text's author, and of 7 independent subject matter experts. The author and the experts' mental representations correlated about .80. For recruits who read the repaired text, their mental representations correlated with the author and experts about .55 = N < 0.05. But recruits who read the original text correlated with the author and experts only about .10. These results suggest that the computational model can be used to improve the learnability of Air Force tests. Individual differences tests of inferencing

AD-A229 005 CONTINUED

ability were developed.

DESCRIPTORS: (U) *SEA WATER CORROSION, *CORROSION RESISTANT ALLOYS, *COPPER ALLOYS, ANODES, VOLTAGE, CALIFORNIA, CHEMICAL REACTIONS, ELECTROCHEMISTRY, LABORATORY TESTS, TIME, MASS TRANSFER, CIRCUITS, ELECTRODES, ROTATION, CALCULI, .

AD-A229 004 12/3

ARIZONA STATE UNIV TEMPE DEPT OF MATHEMATICS

(U) Observability of Systems with Complicated Dynamics.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 90,

OCT 90 8P

PERSONAL AUTHORS: Taylor, Thomas J.

CONTRACT NO. AFOSR-88-0254

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1090, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Significant advances have been made in understanding the observability problem for systems with chaotic or otherwise complicated dynamics. Rigorous connections have been established between the theory of stochastic noise and observations of deterministic dynamical systems which are chaotic or otherwise display a complicated dynamical structure. New techniques have been developed for implementing state estimation of chaotic dynamical systems in the presence of observational noise. A general sufficient condition has been established for the observability of a benchmark class of chaotic dynamical systems, the Anosov diffeomorphisms. (JHD)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, DETERMINANTS(MATHEMATICS), DYNAMICS, ESTIMATES, NOISE, THEORY.

IDENTIFIERS: (U) Chaos, Anosov Diffeomorphism, Stochastic Noise.

AD-A228 969 9/3

CALIFORNIA UNIV LOS ANGELES DEPT OF PHYSICS

(U) Computer Simulations of Radiation Generation from Relativistic Electron Beams.

DESCRIPTIVE NOTE: Final rept. 1 Oct 87-30 Sep 90,

SEP 90 71P

PERSONAL AUTHORS: Lin, Anthony T.

CONTRACT NO. AFOSR-88-0027

PROJECT NO. 2310

TASK NO. A8

MONITOR: AFOSR, XF
TR-90-1102, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In investigating the effects of magnetic field on the output power of a plasma filled Backward Wave Oscillator, It was found that within a certain range of magnetic field the growth rate of beam plasma cyclotron interaction is significantly larger than the conventional backward wave oscillation. Computer simulations of a 100 GHz electron cyclotron autoresonance master oscillator have been carried out. Keywords: Backward wave oscillator; Cyclotron autoresonance maser. (jhd)

DESCRIPTORS: (U) *BACKWARD WAVE OSCILLATORS, *ELECTRON BEAMS, *CYCLOTRON RESONANCE, COMPUTERIZED SIMULATION, CYCLOTRONS, ELECTROMAGNETIC WAVE REFLECTIONS, GROWTH(GENERAL), INTERACTIONS, MAGNETIC FIELDS, OSCILLATION, OUTPUT, PLASMAS(PHYSICS), POWER, RADIATION, RATES, RELATIVITY THEORY.

IDENTIFIERS: (U) Magnicon Maser, PE61102F, WUAFOSR2301A8.

AD-A228 952 12/7

GEORGIA INST OF TECH ATLANTA

(U) Summary of Recent Research Accomplishments on 'Stochastic Network Processes'.

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Jun 90,

JUN 90 8P

PERSONAL AUTHORS: Serfozo, Richard F.

CONTRACT NO. AFOSR-89-0407

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1089, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aim of this research has been to develop stochastic network processes for modeling the movement of discrete units in networks. Primary examples are the movement of data packets in computer networks, the movement of parts and supplies in manufacturing plants or in military support systems, and the movement of smart cars and trucks on electronically monitored highways. The distinguishing feature of our research is the emphasis on the next generation of intelligent networks that will be the backbone of our computer, military and transportation systems. Most of the present theory of stochastic network processes is for unintelligent networks in which the nodes operate independently, the routes of units are independent and the units move one at a time. In an intelligent network, however, the processing at the nodes and the routing typically depend dynamically on the actual congestion, and units move concurrently. Examples of dependencies are routing units to avoid congested nodes, speeding up of processing as queues grow, splitting and merging of units, batch processing and distributed as parallel processing. Our general goal is to provide an understanding of intelligent networks by describing their stochastic behavior. (kr)

DESCRIPTORS: (U) *COMPUTER NETWORKS, *MODELS,

AD-A228 952 CONTINUED

*STOCHASTIC PROCESSES, BATCH PROCESSING, HIGHWAYS, INDUSTRIAL PLANTS, MILITARY ASSISTANCE, NETWORKS, NODES, PACKETS, PARALLEL PROCESSING, PARTS, PROCESSING, QUEUEING THEORY, TRANSPORTATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A228 949 12/9

MARYLAND UNIV COLLEGE PARK

(U) Connectionist Models for Intelligent Computation.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 88-31 Aug 89,

JUL 89 4P

PERSONAL AUTHORS: Chen, H. H.; Lee, Y. C.

REPORT NO. 0388-1

CONTRACT NO. AFOSR-87-0388

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1097, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) 1) Research Objectives: -- To study the underlying principles, architectures and applications of artificial neural networks for intelligent computations. 2) Approach: -- We use both numerical simulation and theoretical analysis to investigate various alternatives in connection schemes, organization principles and architectures of artificial neural networks. 3) Progress for period 9/1/88-8/31/89: -- In the past year, our research on neural network models for intelligent computing under the sponsorship of AFOSR continues to make important progress. In particular, we have constructed the Parallel Sequential Induction Network, a powerful network that self-organizes into an optimal structure to perform classification tasks. In neural network research, much attention has been paid to improving the efficiency of learning connection weights for a network with fixed topology. However, little progress has been made toward uncovering optimal designing principles to reshape the connection topology of a network adaptively to maximize the performance of a specific task. Recent studies indicate that multi-layered feedforward networks of sufficient complexity, in general, need only two hidden layers to imitate any decision hypersurface in the pattern space. (kr)

AD-A228 949 CONTINUED

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *NEURAL NETS, *NUMERICAL ANALYSIS, COMPUTATIONS, EFFICIENCY, INDUCTION SYSTEMS, LEARNING, MODELS, NETWORKS, OPTIMIZATION, ORGANIZATIONS, PARALLEL ORIENTATION, SEQUENCES, THEORY, TOPOLOGY.

IDENTIFIERS: (U) WUAFOSR2305B1, PE61102F.

AD-A228 946 12/3

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) A Monte Carlo Method for Sensitivity Analysis and Parametric Optimization of Nonlinear Stochastic Systems: The Ergodic Case.

DESCRIPTIVE NOTE: Technical rept.,

AUG 90 51P

PERSONAL AUTHORS: Kushner, Harold J.; Yang, Jichuan

REPORT NO. LCDS-90-6

CONTRACT NO. AFOSR-89-0015, DAAL03-86-K-0171

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1136, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by grant NSF-ECS89-13351.

ABSTRACT: (U) For high dimensional or nonlinear problems there are serious limitations on the power of available computational methods for the optimization or parametric optimization of stochastic systems of diffusion type. The paper developes an effective Monte Carlo method for obtaining good estimators of systems sensitivities with respect to system parameters, when the system is interest over a long period of time. The value of the method is borne out by numerical experiments, and the computational requirements are favorable with respect to competing methods when the dimension is high or the nonlinearities 'severe'. The method is a type of derivative of likelihood ratio method method. For a wide class of problems, the cost function or dynamics need not be smooth in the state variables; for example, where the cost is the probability of an event or sign functions appear in the dynamics. Under appropriate conditions, it is shown that the invariant measures are differentiable with respect to the parameters. Since the basic diffusion

AD-A228 946 CONTINUED

(or other) model cannot be simulated exactly, simulatable approximations are discussed in detail, and estimators are obtained and analyzed. It is shown that these estimators and their expectations converge to those for the original problem. Keywords: Parametric optimization of stochastic systems, Ergodic control. (KR)

DESCRIPTORS: (U) *ERGODIC PROCESSES, *MONTE CARLO METHOD, *STOCHASTIC PROCESSES, COMPUTATIONS, COSTS, DIFFUSION, DYNAMICS, FUNCTIONS, INVARIANCE, LIMITATIONS, LONG RANGE(TIME), NONLINEAR SYSTEMS, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, PARAMETERS, PARAMETRIC ANALYSIS, POWER, REQUIREMENTS, SIZES(DIMENSIONS), VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A228 945 5/8 6/4

ILLINOIS UNIV CHAMPAIGN

(U) Towards an Integration of the Non-Invasive Methodologies of Cognitive Neuroscience: The Eleventh Carmel Workshop.

DESCRIPTIVE NOTE: Final technical rept. 3-8 Jan 90,

SEP 90 13P

PERSONAL AUTHORS: Donchin, Emanuel

REPORT NO. CPL-90-2

CONTRACT NO. AFOSR-90-0007

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1081, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The conference brought together investigators who use a variety of techniques designed to visualize the activity on the structure of the brain in awake behaving subjects. At issue was the manor in which the effects using these design techniques can be integrated so as to yield a more comprehensive view of the neurological basis of cognition. (TTL)

DESCRIPTORS: (U) , SYMPOSIA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A228 940 20/2 20/5

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

(U) X-Ray Optics Research.

DESCRIPTIVE NOTE: Final rept. 1 Oct 87-30 Apr 90,

SEP 90 11P

PERSONAL AUTHORS: Falco, Charles M.

CONTRACT NO. AFOSR-88-0010

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1101, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the production of x-ray optical elements for several wavelengths by sputtering. It describes the installation of a 'silicon/metals' molecular beam epitaxy (MBE) apparatus and its use in an extensive study of multilayer mirrors based on molybdenum and silicon. Continuing work on several additional materials is described. Finally, studies of substrate and interfacial roughness, using a scanning tunneling microscope (STM) and a WYKO phase-shifting interferometer, are presented. (TTL)

DESCRIPTORS: (U) *OPTICAL EQUIPMENT COMPONENTS, *SPUTTERING, *X RAYS, *EPITAXIAL GROWTH, FREQUENCY, INTERFACES, INTERFEROMETERS, LAYERS, MICROSCOPES, MIRRORS, MOLYBDENUM, OPTICS, PHASE SHIFT, PRODUCTION, ROUGHNESS, SCANNING, SILICON, SUBSTRATES, TUNNELING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1, MBE(Molecular Beam Epitaxy), STM(Scanning Tunneling Microscope).

AD-A228 939 7/4

KANSAS STATE UNIV MANHATTAN DEPT OF CHEMISTRY

(U) Excitation-Transfer Reactions from N2(A3 Sigma u+) and CO(a3II) to OH,

90 7P

PERSONAL AUTHORS: Wategaonkar, S. J.; Setser, D. W.

CONTRACT NO. AFOSR-88-0279

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1114, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v94 n18 p7200-7205, 1990.

ABSTRACT: (U) Efficient excitation transfer from N2(A) and CO(a) to OH has been observed in a room-temperature flow reactor. The excitation-transfer rate constants for OH(A2Sigma+) formation are (9.5 + or - 1.9) X 10 to the minus 11 power cc/mole/s for N2(A) and CO(a), respectively. These values suggest that excitation transfer makes the dominant contribution to the total quenching of N2(A) and CO(a) by OH. The OH(A) molecules are formed with high rotational energy. Preliminary experiments show that excitation transfer from N2(A) to CH3O occurs, but the rate constant is smaller than for OH. Quenching of N2(A) by SH and SF gave no SH(A-X) or SF(A-Z) emission. The excitation mechanism and the potential surfaces for the OH(A) excitation are qualitatively discussed. (ttl)

DESCRIPTORS: (U) , REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A228 925 20/5

TEXAS CHRISTIAN UNIV FORT WORTH DEPT OF PHYSICS

(U) Rotational and Vibrational Relaxation of Small Molecules in Porous Silica Gels,

90 8P

PERSONAL AUTHORS: Nikiel, L.; Hopkins, B.; Zerda, T. W.

CONTRACT NO. AFOSR-90-0165

PROJECT NO. 3484

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-1092, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v94 n19 p7458-7464 1990.

ABSTRACT: (U) Samples of transparent silica gels of controlled porosities are produced stabilized at 800 C. Raman spectra of samples impregnated with CS2, CHCl3, CH3CN, or acetone are recorded in order to obtain rotational and vibrational correlation functions and correlation times for those liquids. The effect of pore diameters on vibrational dephasing and rotational diffusion is discussed. It is shown that surface interactions, in particular, hydrogen bonding between the imbedded molecules and silanol groups, are responsible for slowing down the rotational relaxation within small pores. A simple model for reorientational motion of molecules hydrogen bonded to the silica surface is proposed. The vibrational modulation times are obtained from the Kubo theoretical function and used to analyze molecular interactions near the silica surface. The number of silanol groups on the surface is estimated from the C=O band of acetone. Keywords: Silica gels, rotational relaxation in pores, Reprints. (JS)

DESCRIPTORS: (U) *MOLECULE MOLECULE INTERACTIONS, ACETONES, CONTROL, CORRELATION, DIFFUSION, FUNCTIONS, FUNCTIONS(MATHEMATICS), GELS, HYDROGEN, HYDROGEN BONDS, INTERACTIONS, MODULATION, MOLECULES, MOTION, ORIENTATION(DIRECTION), POROSITY, POROUS MATERIALS, RAMAN

AD-A228 925 CONTINUED

SPECTRA, RELAXATION, REPRINTS, ROTATION, SAMPLING, SILICON DIOXIDE, SURFACES, TRANSPARENCE, VIBRATION.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A7.

AD-A228 923 12/3

ILLINOIS UNIV AT URBANA DEPT OF AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

(U) Stochastic Dynamics and Bifurcation Behavior of Nonlinear Nonconservative Systems in the Presence of Noise.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 88-31 Jul 90,

AUG 90 232P

PERSONAL AUTHORS: Namachchivaya, N. S.; Leng, Gerard; Tien, Winmin; Doyle, Monica; Talwar, Sanjiv

REPORT NO. AAE-90-7, UILU-ENG-90-0507

CONTRACT NO. AFOSR-88-0233

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1143, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The main objectives of the completed work are to develop mathematical techniques to reduce the dimensionality of multidegree-of-freedom nonlinear systems near bifurcation points and to solve for the response statistics of the reduced system. The asymptotic behavior of nonlinear dynamical systems in the presence of noise is studied using the method of stochastic normal forms. The crucial point in the normal form computations is to find the resonant terms that cannot be eliminated through a nonlinear change of variables. Subsequent to reduction of the dimensionality, a Markovian approximation is used to obtain the associated stochastic normal forms. The key result is that the second order stochastic terms have to be retained in the normal form computations in order to capture the contributions of the stable modes stochastic components to the critical modes drift terms. It is also shown that the method of extended stochastic averaging is in fact 'equivalent' to stochastic normal forms for a specified class of nonlinear systems. In addition, mean square stability of the response is obtained and the bifurcation behavior and associated stationary and transient probability density functions for the reduced stochastic system are determined. Finally, the general results are applied to the study of the dynamics of aircraft at high angles of attack, plates under gas flow, structures under follower forces, and propellant lines conveying pulsating fluid. (JHD)

AD-A228 923 CONTINUED

DESCRIPTORS: (U) *DYNAMICS, *MARKOV PROCESSES, *MATHEMATICAL ANALYSIS, AIRCRAFT, ASYMPTOTIC SERIES, COMPUTATIONS, DRIFT, FLUIDS, GAS FLOW, HIGH ANGLES, MEAN, NONLINEAR SYSTEMS, PROBABILITY DENSITY FUNCTIONS, PULSES, REDUCTION, RESONANCE, RESPONSE, STABILITY, STATISTICS, STOCHASTIC PROCESSES, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1, Bifurcation Theory.

AD-A228 922 6/1

SAN FRANCISCO STATE UNIV CA

(U) Macromolecular Association of ADP-Ribosyltransferase and Its Correlation with Enzymic Activity,

90 11P

PERSONAL AUTHORS: Bauer, Pal I.; Buki, Kalman G.; Hakam, Alaeddin; Kun, Ernest

CONTRACT NO. AFOSR-89-0231

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1118, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The macromolecular self-association of ADP-ribosyltransferase protein in solution was studied by several experimental techniques: quantitative gel filtration, electrophoretic analyses in non-denaturing gels, and cross-linking the enzyme protein with glutaraldehyde, dimethyl pimelimidate, dimethyl subermidate, dimethyl 3,3'-dithiobisproprionimidate and tetranitromethane. The self-association of the polypeptide components obtained by plasmin digestion was also determined by using the above cross-linking agents. Monomers and cross-linked dimers of the enzyme protein, possessing enzymic activity, were separated in non-denaturing gels by electrophoresis. The basic polypeptide fragments, exhibiting molecular masses of 29 kDa and 36 kDa, self-associated, whereas the polypeptides with molecular masses of 56 kDa and 42 kDa associated only to a negligible extent, indicating that the peptide regions that also bind DNA and histones are probable sites of self-association in the intact enzyme molecule. Macromolecular association of the enzyme was indicated by a protein-concentration-dependent red-shift in protein fluorescence. The specific enzymic activity of the isolated ADP-ribosyltransferase depended on the concentration of the enzyme protein, and at 2.00 micrometers concentration the enzyme was self-inhibitory. Dilution of the enzyme protein to 20-40nM resulted in a large increase in its specific activity. Further dilution

to 1-3 nM coincided with a marked decrease of specific activity. Reprints. (JS)

DESCRIPTORS: (U) *ENZYMES, *PROTEINS, CHEMICAL AGENTS, CROSSLINKING(CHEMISTRY), DEOXYRIBONUCLEIC ACIDS, DIGESTION(BIOLOGY), DIMERS, ELECTROPHORESIS, FILTRATION, FLUORESCENCE, GELS, HISTONES, MACROMOLECULES, MOLECULES, MONOMERS, NITROMETHANE, PEPTIDES, PLASMIN, POLYMERS, REGIONS, REPRINTS, TEST METHODS, TETRYL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A228 920 20/4 20/13

PURDUE UNIV LAFAYETTE IN SCHOOL OF MECHANICAL ENGINEERING

(U) Effects of Free Stream Turbulence on Heat Transfer.

DESCRIPTIVE NOTE: Final rept. 1 Apr 87-31 Jul 90,

SEP 90 93P

PERSONAL AUTHORS: Murthy, S. N.; Bradshaw, P.

REPORT NO. AFW/M-B/90-1

CONTRACT NO. F49620-87-K-0008

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR
TR-90-1152

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Stanford Univ.

ABSTRACT: (U) The Report presents the research (including relevant publications) undertaken at Purdue University and, under subcontract, at Imperial College, London, on analytical-computational and experimental studies on the determination of the influence of inhomogeneous and isotropic turbulence on boundary layers, including cases with heat transfer. The modelling of the influence of Free Stream Turbulence on boundary layer turbulence (BLT) has been based on the so-called large eddy interaction hypothesis, wherein the interaction between a representative large eddy and all of the eddies is related to a skewness factor and a damping factor. The boundary layer is divided into four asymptotically matched regions, including the free stream, and the flowfield is calculated based on the necessary (as proved herein) assumption of the existence of a logarithmic law region adjoining the wall viscous region. A detailed comparison between the experimental data Hancock and Bradshaw and the predictions obtained for the same case of interaction between FST and BLT is a fully-developed TBL is presented and provides substantial credibility to

AD-A228 920

AD-A228 920 CONTINUED

the method of approach. The experimental work at Imperial College has been devoted to a study of the effects of anisotropic FST on heat transfer in low speed TBL. (kr)

DESCRIPTORS: (U) *FREE STREAM, *HEAT TRANSFER, *TURBULENT BOUNDARY LAYER, BOUNDARY LAYER, DAMPING, EDDIES(FLUID MECHANICS), EDDY CURRENTS, EXPERIMENTAL DATA, FLOW FIELDS, INTERACTIONS, ISOTROPISM, LOGARITHM FUNCTIONS, LOW VELOCITY, MATCHING, REGIONS, SKEWNESS, TURBULENCE, VISCOUS FLOW, WALLS.

IDENTIFIERS: (U) WUAFOSR2307A4, PE61102F.

AD-A228 920

AD-A228 908 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) A New Trifluorosilyl Exchange Reagent: Reactions of Cd(SiF3)2.glyme (glyme = dimethoxyethane) with Dibromo Metal Phosphine Complexes of Platinum, Palladium, and Nickel yield Trifluorosilyl Substituted Dialkyl Compounds,

90 4P

PERSONAL AUTHORS: Guerra, Miguel A.; Lagow, Richard J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-1093, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society, Chemical Communications, n1 p65-66 1990.

ABSTRACT: (U) The reaction of excess Cd(SiF3)2.glyme (glyme = dimethoxyethane) with trimethylphospine metal dibromides of platinum, palladium, and nickel yielded the trifluorosilyl substituted dialkyl compounds trans-Pt(SiF3)2(PMe3)2, Pd(SiF3)2(PMe3)2, and Ni(SiF3)2(PMe3)3. (TTL)

DESCRIPTORS: (U) , NICKEL, PALLADIUM, PLATINUM.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, Trifluorosilyl, Dimethoxyethane.

AD-A228 879 7/6

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) A Synthesis for SF(5) Substituted Fluorocarbon Polymers,

90 5P

PERSONAL AUTHORS: Kawa, H.; Partovi, S. N.; Ziegler, B. J. ; Lagow, R. J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-1095, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Polymer Science: Part C: Polymer Letters, v28 p297-300 1990.

ABSTRACT: (U) Synthesis of both hydrocarbon and perfluorocarbon vinyl polymers containing the SF5 group have been accomplished by the reaction of elemental fluorine with poly (S-vinyl-O-t-butylthiocarbonate). The resulting linear polymers have pendant SF5 groups with similar structures to polytetrafluoroethylene and polyethylene. Keywords: Fluorocarbon polymers, Sulfur pentafluoried, Electric insulators, Polymers. (JS)

DESCRIPTORS: (U) *POLYMERS, ELECTRIC POWER, FLUORINATED HYDROCARBONS, FLUOROPOLYMERS, HYDROCARBONS, INSULATION, LINEAR SYSTEMS, POLYETHYLENE, STRUCTURES, SULFUR, SYNTHESIS, TETRAFLUOROETHYLENE RESINS, VINYL PLASTICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A228 877 12/5 20/11

CORNELL UNIV ITHACA NY DEPT OF STRUCTURAL ENGINEERING

(U) Probabilistic Fracture Mechanics: A Validation of Predictive Capability.

DESCRIPTIVE NOTE: Final rept. 4 Jan 87-30 Dec 89,

AUG 90 155P

PERSONAL AUTHORS: Ingraffea, Anthony R.; Grigoriu, Mircea

REPORT NO. 90-8

CONTRACT NO. F49620-87-C-0054

PROJECT NO. 2302

TASK NO. C2

MONITOR: AFOSR, XF
Tr-90-1074, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A two-phase task was undertaken to the Probabilistic Fracture Analysis Code (PROFRANC) developed under this project. Phase one consisted in predicting deterministically the outcome of a subset of a larger number of experiments in which variability in geometry and material parameters was purposely minimized. The purpose of this phase was to verify that PROFRANC could predict nearly deterministic events accurately. This phase was shown to be highly successful. This verification was based on experimental results which had to be obtained within this project due to a paucity of comprehensive mixed-mode fracture propagation data in the open literature. In Phase two all currently available data involving inherent uncertainties in some material and geometrical parameters was assembled in a probabilistic framework and subsequently compared to the probabilistic predictions of PROFRANC qualitatively and quantitatively. Theses comparisons were shown to be very successful. The quantitative comparison was performed by hypothesis testing, which is a mathematical rule deciding whether to except or reject PROFRANC predictions using experimental data. (kr)

DESCRIPTORS: (U) *COMPUTER PROGRAM VERIFICATION,

AD-A228 877 CONTINUED

*FRACTURE(MECHANICS), CODING, COMPARISON, DETERMINANTS(MATHEMATICS), EXPERIMENTAL DATA, GEOMETRY, HYPOTHESES, MATERIALS, PARAMETERS, PREDICTIONS, PROBABILITY, TEST AND EVALUATION, THESES, TWO PHASE FLOW, VALIDATION, VERIFICATION.

IDENTIFIERS: (U) WUAFOSR2302C2, PE61102F, PROFRANC(Probalistic Fracture Analysis Code).

AD-A228 876 7/2 7/3 20/5

STATE UNIV OF NEW YORK AT BUFFALO RESEARCH FOUNDATION

(U) Design, Ultrastructure and Dynamics of Nonlinear Optical Interactions in Polymeric Thin Films.

DESCRIPTIVE NOTE: Final technical rept. 1 Mar 87-30 Mar 90,

OCT 90 26P

PERSONAL AUTHORS: Prasad, Paras N.

CONTRACT NO. F49620-87-C-0042

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1066, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program covered microscopic theory of optical nonlinearity, design and synthesis of novel structures, materials processing for guided waves, measurements of optical nonlinearities and study of device processes. Both classical anharmonic oscillator approach as well as ab-initio calculations to understand the microscopic nature of optical nonlinearities in organic structures had been described. The ultimate goal is to understand the structure-property relationship so that one may be able to predict structures with enhanced optical nonlinearities. The focus of our work has been on third-order optical nonlinearity. We developed a simple model of coupled locally an harmonic oscillators which can be used to describe the optical nonlinearities in conjugated organic monomeric, oligomeric and polymeric structures. We showed that the method can very readily be used to explain the dependence of the band gap, the polarizability, alpha, and the second hyperpolarizability, gamma, as a function of the number of repeat units for the oligomers of thiopene and benzen. The results predicted by the coupled anharmonic oscillator model are in good agreement with those of the experimental studies of thiophene and benzene oligomers recently reported by our group. In addition, the predicted power dependences of orientationally averaged (alpha) and (gamma) on the

number of repeat units were compared with those predicted by a free electron model, PPP methods, sum-over-states method and ab initio calculations. (TTL)

DESCRIPTORS: (U) *BENZENE, *OPTICAL PROPERTIES, *POLYMERIC FILMS, *THIN FILMS, *THIOPHENES, ANHARMONIC OSCILLATORS, COUPLING(INTERACTION), DYNAMICS, EXPERIMENTAL DATA, FREE ELECTRONS, GUIDANCE, HARMONIC GENERATORS, INTERACTIONS, MATERIALS, MODELS, MOLECULAR STRUCTURE, NONLINEAR SYSTEMS, OLIGOMERS, PHYSICAL PROPERTIES, POLARIZATION, POLYMERS, PROCESSING, STRUCTURES, SYNTHESIS, WAVEFORMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3, Optical nonlinearities, Harmonic oscillators.

AD-A228 873 12/7 12/5

STANFORD UNIV CA

(U) Research into the Design and Implementation of Knowledge Base Systems.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 90,

JUL 90 8P

PERSONAL AUTHORS: Ullman, Jeffrey D.

CONTRACT NO. AFOSR-88-0266

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-1106, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The general goal of the work has been to develop the techniques needed to process queries, expressed as logic programs, efficiently. A system called NAIL was developed, bu mid-1989, to test out our ideas. It was fully declarative, which we found an interesting challenge, and its implementation exposed a number of issues that lead to important new ideas and research. However, the full declarativeness proved too much of a burden in writing some applications that we hoped would be facilitated by a logic/database language, and NAIL was abandoned in favor of a new language, called GLUE, that is logical, but that allows for controlled-flow, sets as data values, aggregation operators such as sums of average. NAIL now serves as the view facility for GLUE, and we are in the process of writing a NAIL-to-GLUE translator that will offer both nondeclarative capabilities of GLUE and the declarative capabilities of NAIL, whichever is more appropriate in a given situation. (Author) (kr)

DESCRIPTORS: (U) *KNOWLEDGE BASED SYSTEMS, *SYSTEMS ENGINEERING, *PROGRAMMING LANGUAGE, DATA BASES, INTERROGATION, LOGIC.

IDENTIFIERS: (U) WUAFOSR2304A7, PE62202F, GLUE programming language.

AD-A228 873

AD-A228 872 20/6.1 25/3

COLORADO UNIV AT BOULDER

(U) Applications of Non-Linear Optics.

DESCRIPTIVE NOTE: Final rept. 1 Mar 87-28 Feb 90,

FEB 90 20P

PERSONAL AUTHORS: Anderson, Dana Z.

CONTRACT NO. AFOSR-87-0163

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1103, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Spatial mode-multiplexing is used to transmit several communication channels on a single multimode optical fiber. Each channel is encoded by an orthogonal pattern produced by a spatial light modulator. A photorefractive medium holographically decodes the output speckle pattern at a receiver station. A ring and star architectures for interconnection networks is demonstrated. Typical crosstalk to signal ratios, for fully interconnected 3 processor networks, are -24 and -26 dB for the ring and star respectively. Keywords: Fiber optics; Optical communications. (RH)

DESCRIPTORS: (U) *SPATIAL FILTERING, *FIBER OPTICS, *LIGHT MODULATORS, *OPTICAL COMMUNICATIONS, *NONLINEAR OPTICS, CHANNELS, CIRCUIT INTERCONNECTIONS, CROSSTALK, MULTIPLEXING, MULTIMODE, NETWORKS, NONLINEAR SYSTEMS, ORTHOGONALITY, OUTPUT, PATTERNS, RATIOS, RECEIVERS, SIGNALS, SPATIAL DISTRIBUTION, SPECULAR REFLECTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A228 872

AD-A228 842 9/1

CALIFORNIA UNIV LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Multiple Optical Probing of High Frequency Semiconductor Devices.

DESCRIPTIVE NOTE: Final rept. 15 Nov 88-14 Nov 89,

NOV 89 48P

PERSONAL AUTHORS: Fetterman, Harold

CONTRACT NO. AFOSR-89-0111

PROJECT NO. 3842

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-1129, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The purchase was made of a complete Nd: YAG pumped picosecond dye laser and related optical components. Matching support was provided for an autocorrelator, power meters, lock-in detectors and Optical Table to form a complete measurement system. The idea was to fabricate a picosecond system which would measure devices and systems out to at least 200 GHz. It would be used to validate Network analyzer measurements in the region of overlap and to develop a degree of confidence in the entire technique of S parameter measurement using picosecond pulses. The highest frequency GaAs and GaAs alloy devices were investigated. New types of devices, MMIC amplifiers and finally the operational constraints of optical interconnections were studied. The system proved to be so useful that we actually performed to be so useful that we actuall performed all of these tests and have extended these measurements to the generation of millimeter radiation and the demonstration of spectroscopic use. Current measurements are on ballistic field effect devices and resonant tunneling structures which have been fabricated by local industries and universities directly as a result of this unique measurement capability. (rh)

DESCRIPTORS: (U) *PULSED LASERS, *LIGHT PULSES, *PROBES,

AD-A228 842 CONTINUED

ALLOYS, ANALYZERS, BALLISTICS, CIRCUIT INTERCONNECTIONS, CONFIDENCE LEVEL, DEMONSTRATIONS, DETECTORS, DYE LASERS, GALLIUM ARSENIDES, HIGH FREQUENCY, MATCHING, MEASUREMENT, MILLIMETER WAVES, NETWORKS, OPTICAL CIRCUITS, OPTICAL EQUIPMENT, OPTICAL PROPERTIES, OVERLAP, PARAMETERS, POWER METERS, LASER PUMPING, RESONANCE, SEMICONDUCTOR DEVICES, SPECTROSCOPY, STRUCTURES, TABLES(DATA), TUNNELING(ELECTRONICS), YTTRIUM ALUMINUM GARNET.

IDENTIFIERS: (U) PE61104D, WUAFOSR23842A6, Nd:YAG Lasers.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A228 841 12/9

CALIFORNIA INST OF TECH PASADENA

(U) Optoelectronic Realizations of Neural Network Models.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 88-28 Feb 90,

OCT 90 22P

PERSONAL AUTHORS: Yariv, Amnon; Agranat, A.; Neugebauer, C.; Leyva, V.

CONTRACT NO. F49620-88-C-0112, DARPA Order-6485

MONITOR: AFOSR, XF
TR-90-1068, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research project is aimed at developing silicon based implementations of neural network models. The main advantages of our approach are its use of standard, present day technology and its highly memory due to the use of optics. Two different embodiments of the electronic part of the neural processor have been realized. A phototransistor based network using standard complementary metal oxide semiconductors technology has been built and tested. The CCD version of the optoelectronic architecture has been fabricated and tested, proving the viability of this architecture. All electronic loading has been explored and offers possibilities of rugged, compact systems. (KR)

DESCRIPTORS: (U) *ELECTROOPTICS, *NEURAL NETS, ARCHITECTURE, DAY, LOADING(ELECTRONICS), MODELS, NERVOUS SYSTEM, NETWORKS, COMPLEMENTARY METAL OXIDE SEMICONDUCTORS, OPTICS, PHOTOTRANSISTORS, PROCESSING EQUIPMENT, RUGGEDIZED EQUIPMENT, SILICON.

IDENTIFIERS: (U) PE61102F.

AD-A228 840 9/1 12/9

NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIV GREENSBORO

(U) Application of Error Correcting Codes in Fault-Tolerant Logic Design for VLSI Circuits.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 89-31 May 90,

MAY 90 21P

PERSONAL AUTHORS: Lala, P. K.; Martin, H. L.

CONTRACT NO. F49620-89-C-0069

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1065, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) It is now generally accepted that not all faults in VLSI logic can be represented by the stuck-at-0 and stuck-at-1 models used at the gate level. In order to ensure realistic modeling, faults should be considered at the transistor level, since only at the level the complete circuit structure is known. In other words, test for circuits should be derived based on possible 'shorts' and 'opens' at the transistor level. A stuck-open or stuck-closed transistor can be modeled by replacing the faulty transistor with an open connection or a direct short respectively between the transistor's source and drain. (rh)

DESCRIPTORS: (U) *ERROR CORRECTION CODES, *FAULTS, *GATES(CIRCUITS), *LOGIC, *TRANSISTORS, CIRCUITS, SOURCES, TOLERANCE.

IDENTIFIERS: (U) WAUFOSR2305B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A228 838 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE CENTER FOR SPACE RESEARCH

(U) Particle Acceleration by Electromagnetic Ion Cyclotron Turbulence.

89 37P

PERSONAL AUTHORS: Crew, G. B.; Chang, Tom

CONTRACT NO. F19628-86-K-0005, F19628-88-K-0008

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1063, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics of Space Plasmas, SPI Conference Proceedings and Reprint Series, n9 p31-66 1989.

ABSTRACT: (U) Low frequency electromagnetic turbulence is proving to be an important source of energy for the acceleration of ions in various regions of the Earth's magnetosphere. In particular it has been shown to account for some of the energetic oxygen conics found in the auroral regions, and a convincing case is being built for its role in the cusp/cleft region of the magnetosphere. The transfer of energy from the waves to the particles is efficiently accomplished through ion cyclotron resonance with the left-hand polarized component of the turbulence, and the result of the interaction is a heating of the particle distribution. In this tutorial review, we shall present a general theoretical treatment of ion cyclotron resonance heating in a weakly inhomogeneous magnetic geometry and then proceed to examine the formation of auroral ion conics in somewhat greater detail. For the auroral case, the properties of the electric field spectral density and the Earth's dipolar magnetic field allow the introduction of a similarity transformation which results in a considerable simplification of the analysis for the altitude asymptotic form of the conic distribution. The merit of this approach is that it makes it possible to directly compare the theory with observations, and the agreement is found to be excellent.

AD-A228 838

AD-A228 838 CONTINUED

Reprints. (JHD)

DESCRIPTORS: (U) *ACCELERATION, *AURORAE, *CYCLOTRON WAVES, *IONS, *MAGNETOSPHERE, CYCLOTRON RESONANCE, DIPOLES, DISTRIBUTION, EARTH(PLANET), ELECTRIC FIELDS, ELECTROMAGNETISM, ENERGY, ENERGY TRANSFER, HEATING, INTERACTIONS, LOW FREQUENCY, MAGNETIC FIELDS, POLAR REGIONS, POLARIZATION, REPRINTS, SOURCES, SPECTRAL ENERGY DISTRIBUTION, TURBULENCE, WAVES.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A2, Ion conics, Conical Distribution Fucntions, Ion Cyclotron Waves.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A228 801 4/2

COLORADO STATE UNIV FORT COLLINS DEPT OF ATMOSPHERIC SCIENCE

(U) The Relevance of the Microphysical and Radiative Properties of Cirrus Clouds to Climate and Climatic Feedback.

JUL 90 13P

PERSONAL AUTHORS: Stephens, Graeme L.; Tsay, Si-Chee; Stackhouse, Paul W., Jr.; Flatau, Piotr J.

CONTRACT NO. AFOSR-88-0143

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1113, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Atmospheric Sciences, v47 n14 p1742-1753, 15 Jul 90.

ABSTRACT: (U) This reprint examines the effects of the relationship between cirrus cloud ice water content and cloud temperature on climate change. A simple mechanistic climate model is used to study the feedback between ice water content and temperature. The central question studied in this paper concerns the extent to which both the radiative and microphysical properties of cirrus cloud influence such a feedback. To address this question, a parameterization of the albedo and emissivity of clouds is introduced. Observations that relate the ice water content to cloud temperature are incorporated in the parameterization to introduce a temperature dependence to both albedo and emittance. The cloud properties relevant to the cloud feedback are expressed as functions of particles size r sub e, asymmetry parameter g and cloud temperature and analyses of aircraft measurements, lidar and ground based radiometer data are used to select r sub e and g. It was shown that scattering calculations assuming spherical particles with a distribution described by r sub e = 16 microns reasonably matched the lidar and radiometer data. However, comparison of cloud radiation properties measured from aircraft to those

AD-A228 801

AD-A228 801 CONTINUED

parameterized in this study required values of g significantly smaller than those derived for spheres but consistent with out understanding of non-spherical particle scattering. Keywords: Cloud microphysics; Radiative transfer. (kr)

DESCRIPTORS: (U) *CIRRUS CLOUDS, *CLOUD PHYSICS, *MOISTURE CONTENT, *RADIATION PATTERNS, AIRCRAFT, ALBEDO, ATMOSPHERE MODELS, CLIMATE, CLOUDS, COMPUTATIONS, EMISSIVITY, FEEDBACK, GROUND BASED, ICE, MEASUREMENT, NUCLEAR SCATTERING, OPTICAL RADAR, PARTICLES, RADIATIVE TRANSFER, RADIOMETRY, REPRINTS, SCATTERING, SIZES(DIMENSIONS), SPHERES, TEMPERATURE, THERMAL PROPERTIES.

IDENTIFIERS: (U) *PE61102F, WUAFOSR2310A1.

AD-A228 797 9/5

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES SIGNAL AND IMAGE PROCESSING INS T

(U) Research in Optical Symbolic Tasks.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 86-29 Nov 89,

NOV 89 151P

PERSONAL AUTHORS: Jenkins, Keith

CONTRACT NO. AFOSR-86-0196

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1130, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research findings of the AFOSR Grant AFOSR-86-0196, Optical Symbolic Computing Tasks are summarized. The grant period was 1 June 1986 - 29 November 1989. Specifically, we have concentrated on the following topics: complexity studies for optical neural and digital systems, architecture and models for optical computing, learning algorithms for neural networks and applications of neural networks for early vision problems such as image restoration, texture segmentation, computation of optical flow and stero. A number of conference and journal papers reporting the research findings have been published. A list of publications and presentation is given at the end of the report along with a set or reprints. (kr)

DESCRIPTORS: (U) *COMPUTATIONS, *OPTICAL PROCESSING, ALGORITHMS, DIGITAL SYSTEMS, FLOW, IMAGE RESTORATION, LEARNING, NERVOUS SYSTEM, NEURAL NETS, OPTICAL EQUIPMENT, OPTICAL PROPERTIES, REPRINTS, SEGMENTED, SYMBOLS, SYMPOSIA, TEXTURE, VISION.

IDENTIFIERS: (U) WUAFOSR2305B1.

AD-A228 797

AD-A228 773 3/2

JOHNS HOPKINS UNIV LAUREL MD APPLIED PHYSICS LAB

(U) Center for Applied Solar Physics.

DESCRIPTIVE NOTE: Final rept. 1 Dec 86-30 Apr 90,

APR 90 16P

PERSONAL AUTHORS: Rust, David M,

CONTRACT NO. AFOSR-87-0077

PROJECT NO. 3484

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-1111, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) New instruments have been installed at observatories in New Mexico and California for measuring solar magnetic fields and surface velocities. The magnetic fields provide the energy for all eruptive and accelerative processes on the Sun, and the surface velocities reveal the dynamics of the solar interior. Early detection of emerging magnetic fields may given several hours' warning of impending solar flares and interplanetary shocks. The new instruments incorporate several technical innovations, including lithium niobate filter for high spectral resolution. With this filter, circular and linear polarization and Doppler shifts are measured in solar spectral lines to yield estimates of the magnetic field vector in active sunspot regions. A program of daily measurements is planned for study of the current peak in the 11-year solar cycle. Keywords: Sunspots, Solar magnetic fields, Surface velocities. (JHD)

DESCRIPTORS: (U) *SOLAR PHYSICS, *MAGNETIC FIELDS, *FORECASTING, *SUNSPOTS, ACCELERATION, CIRCULAR, DAILY OCCURRENCE, DETECTION, DOPPLER EFFECT, DYNAMICS, ESTIMATES, OPTICAL FILTERS, HIGH RESOLUTION, INSTRUMENTATION, LINEAR POLARIZATION, LITHIUM NIOBATES, MEASUREMENT, PEAK VALUES, REGIONS, SOLAR FLARES, SOLAR SPECTRUM, SPECTRA, SPECTRAL LINES, SUN, SURFACES, VELOCITY, WARNING SYSTEMS, YIELD.

AD-A228 773

AD-A228 773 CONTINUED

IDENTIFIERS: (U) WUAFOSR3484A6, PE61102D.

AD-A228 768 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) The Electron Beam Instability and Turbulence Theories,

89 31P

PERSONAL AUTHORS: Dum, C. T.

CONTRACT NO. F49620-86-C-0128

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1084, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics of Space Plasmas, SPI Conference Proceedings and Reprint Series, n9 p87-96 1989.

ABSTRACT: (U) The excitation of Langmuir waves by a gentle bump-on-tail has become the classic example for a kinetic instability. Must turbulence theories, ranging from quasi-linear theory to strong turbulence, have also been developed starting from this model. We discuss the practical application and the extension of these theories to recent observations of electron beam-plasma interactions. Observations in the electron foreshock, in particular, show that linear instability theory must be extended to also describe the excitation of waves with frequencies substantially different from the plasma frequency. New questions about turbulence theories are then raised. The departure point for any extensions should be a quantitative test of existing theories, starting from linear instability theory for the actual non-Maxwellian distribution functions and other features predicted by quasi-linear theory. Particle simulations allowing for such tests are described. It is the unique advantage of simulation studies that more physics can be added step by step. This procedure is used to differentiate between various nonlinear turbulence effects. Reprints. (JHD)

DESCRIPTORS: (U) *ELECTRON BEAMS, *IONOSPHERIC DISTURBANCES, *PLASMA WAVES, EXCITATION, INTERACTIONS, KINETICS, LANGMUIR PROBES, LINEARITY, NONLINEAR SYSTEMS,

AD-A228 768 CONTINUED

PARTICLES, PLASMAS(PHYSICS), REPRINTS, SIMULATION, STABILITY, TEST AND EVALUATION, THEORY, TURBULENCE.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A2, Langmuir Plasmas, Plasma Instabilities, Langmuir Waves.

AD-A228 767 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Heating of Ion Conics in the Cusp/Cleft,

89 12P

PERSONAL AUTHORS: Andre, Mats; Crew, G. B.; Peterson, W. K.; Persoon, A. M.; Pollock, C. J.

CONTRACT NO. F49620-86-C-0128

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1085, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics of Space Plasmas, SPI Conference Proceedings and Reprint Series, n9 p203-213 1989.

ABSTRACT: (U) Ion conic distributions are often observed in the cusp/cleft region of the dayside magnetosphere. We show that these ions can be heated by resonant interactions with broadband low-frequency (near the ion gyrofrequency) waves. Data from one cusp/cleft crossing of the polar orbiting DE-1 satellite is studied in detail. Observed cool O+ distributions and observed wave intensities are used as input to a Monte Carlo simulations. The theoretically obtained hot O+ distributions are in good agreement with the corresponding observed distributions. This resonant heating by broadband low-frequency waves is important for the outflow of ionospheric ions into the magnetosphere. Reprints. (JHD)

DESCRIPTORS: (U) *IONOSPHERIC DISTURBANCES, *MAGNETOSPHERE, BROADBAND, DISTRIBUTION, OXYGEN, HEATING, INTENSITY, INTERACTIONS, IONS, LOW FREQUENCY, MONTE CARLO METHOD, REPRINTS, RESONANCE, SIMULATION, RADIO WAVES.

IDENTIFIERS: (U) Ion Conics, Ion Cyclotron Waves, PE61103D, WUAFOSR3484A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A228 766 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Simulation Studies of Plasma Waves in the Electron Foreshock: The Generation of Downshifted Oscillations,

JUN 90 9P

PERSONAL AUTHORS: Dum, C. T.

CONTRACT NO. AFOSR-90-0085

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1108, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v95 nA6, p8123-8131, 1 Jun 90.

ABSTRACT: (U) The generation of waves with frequencies downshifted from the plasma frequency, as observed in the electron foreshock, is analyzed by particle simulation. Wave excitation differs fundamentally from the familiar excitation of the plasma eigenmodes by a gentle bump-on-tail electrons distribution. Beam modes are destabilized by resonant interaction with bulk electrons, provided the beam velocity spread is very small. These modes are stabilized, starting with the higher frequencies, as the beam is broadened and slowed down by the interaction with the wave spectrum. Initially, a very cold beam is also capable of exciting frequencies considerably above the plasma frequency, but such oscillations are quickly stabilized. Low-frequency modes persist for a long time, until the bump in the electron distribution is completely 'ironed' out. This diffusion process also is quite different from the familiar case of well-separated beam and bulk electrons. A quantitative analysis of these processes is carried out. Keywords: Reprints; Plasma waves; Electron foreshock; Simulation; Downshifted oscillations; Diffusion; Electron beam. (JHD)

DESCRIPTORS: (U) , *IONOSPHERIC DISTURBANCES, *PLASMA OSCILLATION, *PLASMA WAVES, DIFFUSION, DISTRIBUTION, EIGENVECTORS, ELECTRON BEAMS, ELECTRONS, EXCITATION,

AD-A228 766 CONTINUED

INTERACTIONS, LOW FREQUENCY, LOW TEMPERATURE, PARTICLES, PLASMAS(PHYSICS), QUANTITATIVE ANALYSIS, REPRINTS, RESONANCE, SIMULATION, SPECTRA, VELOCITY, WAVES.

IDENTIFIERS: (U) Electron Foreshock, PE61103D, WUAFOSR3484A2.

AD-A228 765 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Simulation Studies of Plasma Waves in the Electron Foreshock: The Generation of Langmuir Waves by a Gentle Bump-on-Tail Electron Distribution,

JUN 90 18P

PERSONAL AUTHORS: Dum, C. T.

CONTRACT NO. AFOSR-90-0085

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1109, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v95 nA6 p8095-8110, 1 Jun 90.

ABSTRACT: (U) The generation of Langmuir waves by a gentle bump-on-tail electron distribution is analyzed. It is shown that with appropriately designed simulation experiments, quasi-linear theory can be quantitatively verified for parameters corresponding to the electron foreshock. The distribution function developed a plateau by resonant diffusion, and changes outside this velocity range are negligible, except for the contribution of nonresonant diffusion to acceleration of bulk electrons. The dispersions relation is solved for the evolving distribution function and exhibits the dynamics of wave growth and changes in real frequency. The integral of the quasi-liner equations is also used to relate the evolution of distribution function and wave spectrum and gives agreement with the simulations. Even in extremely long simulation runs there is practically no evolution in wave energy or the distribution function once a plateau has been formed. The saturated field levels are much lower than the estimates that are generally used to assess the importance of additional weak or strong turbulence effects. These effects cannot prevent plateau formation and are only noticeable if ions are also included in the model. They then lead to a redistribution of the spectrum toward low wave numbers modes which

propagate mainly opposite to the beam. This occurs long after plateau formation and play no significant role in the overall system dynamics or energy balance. One will have to live with quasi-linear theory as a key ingredient for a global model of foreshock wave phenomena. Reprints. (JHD)

DESCRIPTORS: (U) *IONOSPHERIC DISTURBANCES, *PLASMA WAVES, ACCELERATION, BALANCE, DIFFUSION, DISTRIBUTION, DISTRIBUTION FUNCTIONS, DYNAMICS, ELECTRONS, ENERGY, EVOLUTION(GENERAL), GLOBAL, GROWTH(GENERAL), IONS, LANGMUIR PROBES, MODELS, REPRINTS, CYCLOTRON RESONANCE, SATURATION, SIMULATION, SPECTRA, TURBULENCE, VELOCITY.

IDENTIFIERS: (U) Langmuir Plasmas, PE61103D, WUAFOSR3484A2, Electron Foreshock, Langmuir Waves.

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A228 764 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Particle Acceleration by Intense Auroral VLF Turbulence,

89 43P

PERSONAL AUTHORS: Retterer, John M.; Chang, Tom; Jasperse, J. R.

CONTRACT NO. F49620-86-C-0128

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1067, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics of Space Plasmas, SPI Conference Proceedings and Reprint Series, n9 p119-160 1989.

ABSTRACT: (U) Broadband turbulence in the lower-hybrid to plasma frequency range is found in a variety of forms in the supraauroral region, must notably as auroral his and VLF saucers. When the turbulence is intense, it is observed to be associated with ion conics (ions heated transverse to the geomagnetic field) and counter-streaming electron fluxes (heated in both directions parallel to the field). This tutorial will begin with a review of the dispersion and propagation characteristics of whistler resonance-cone waves, which comprise the turbulence, and go on to discuss the theories for the excitation of the turbulence. Plasma simulation and mesoscale (Monte Carlo) simulation techniques will be used to illustrate the interaction of the ambient plasma with the turbulence. These calculations will demonstrate how this interaction results in transverse heating of the ions and parallel heating of the electrons of the plasma, leading to the formation of the observed heated and accelerated particle fluxes. Keywords: Lower hybrid waves, VLF waves, Ion conics, Strong turbulence. Reprints. (JHD)

DESCRIPTORS: (U) *AURORAE, BROADBAND, ELECTRONS, ACCELERATION, WHISTLERS, EXCITATION, GEOMAGNETISM, HEAT,

AD-A228 764 CONTINUED

HEATING, HYBRID SYSTEMS, INTENSITY, INTERACTIONS, IONS, MAGNETIC FIELDS, METHODOLOGY, MONTE CARLO METHOD, PARALLEL ORIENTATION, PARTICLE FLUX, PLASMAS(PHYSICS), PROPAGATION, REPRINTS, SIMULATION, TRANSVERSE, TURBULENCE, VERY LOW FREQUENCY, PLASMA WAVES.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A2, Ion Conics.

AD-A228 763 20/4

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Numerical Study of a Three-Dimensional Vortex Method,

JAN 90 33P

PERSONAL AUTHORS: Knio, Omar M.; Ghoniem, Ahmed F.

CONTRACT NO. AFOSR-89-0491

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1142, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Computational Physics, v86 n1 p75-106 Jan 90.

ABSTRACT: (U) Numerical simulation is used to study mixing of a passive scalar in a spatially-developing shear layer at high Reynolds number. The numerical method is based on discretization of the vorticity and scalar gradients into finite-area elements and the transport of these elements along particle trajectories. Results show that mixing is governed by the entrainment of fluid from both streams into the large structures generated by the rollup of the vorticity layer. Local value of scalar concentration oscillates, due to the passage of these structures, between values limited by the Peclet number. Instantaneous scalar profiles exhibit mixing asymmetry and the skewness of concentration fraction within the eddies in favor of the high-speed stream. Mixing statistics of a passive scalar agree well with the experimental measurements of Masutani and Bowman in a two-dimensional shear layer, and emphasize the effect of molecular diffusion on mixing. The rate of burning in a single step Arrhenius chemical reactions between the two streams increases due to mixing enhancement, overcoming the decrease due to the strain field generated by rollup. Local product concentration is everywhere proportional to the vorticity, suggesting a new formula for turbulent combustion modeling. (Author) (KR)

DESCRIPTORS: (U) *ENTRAINMENT, *NUMERICAL ANALYSIS,

*THREE DIMENSIONAL FLOW, *VORTICES, ASYMMETRY, COMBUSTION, DIFFUSION, EXPERIMENTAL DATA, FLUIDS, FORMULATIONS, GRADIENTS, HIGH RATE, LAYERS, MATHEMATICAL MODELS, MEASUREMENT, METHODOLOGY, MIXING, EDDIES(FLUID MECHANICS), MODELS, MOLECULES, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, PARTICLE TRAJECTORIES, PASSIVE SYSTEMS, PROFILES, REYNOLDS NUMBER, SCALAR FUNCTIONS, SHEAR PROPERTIES, STATISTICS, STREAMS, STRUCTURES, DIGITAL SIMULATION, TURBULENCE, TWO DIMENSIONAL.

IDENTIFIERS: (U) Turbulent Combustion, PE61102F, WUAFOSR2308A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A228 762 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Simulation Studies of Plasma Waves in the Electron Foreshock: The Transition from Reactive to Kinetic Instability,

JUN 90 14P

PERSONAL AUTHORS: Dum, C. T.

CONTRACT NO. AFOSR-90-0085

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1110, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v95 nA6 p8111-8122, 1 Jun 90.

ABSTRACT: (U) The electron beam-plasma instability is analyzed in particle simulation experiments, starting with a beam of small velocity spread. The dispersion relation is solved for snapshots of the actual evolving electron distribution function, rather than for the usual models consisting of Maxwellians. As the beam broadens, the analysis shows a transition from reactive beam modes, with frequencies extending much below the plasma frequency omega sub e to kinetic instability of Langmuir waves, omega approx. = omega sub e which is in agreement with the frequencies and growth rates observed in the simulation. Beam evaluation is also in agreement with quasi-linear theory, except at the end of the reactive phase when trapping of beam electrons is seen. Although the spectrum temporarily narrows at this stage, there are, in contrast to previous simulations, still many modes present. The system then can proceed to a kinetic phase in which quasi-linear theory is again applicable. This stage is identical with the evolution starting from a gentle broad beam, except that wave levels are several times higher. With higher wave levels, mode coupling effects are also more prominent, but are still unable to prevent plateau formation. In contrast to the Langmuir wave regime, the reactive broadband wave regime lasts only for a relatively short period. In the electron foreshock it could only persist if a narrow beam or a sharp cutoff feature were maintained by continued beam injection and the time-of-flight mechanism. Reprints. (JHD)

AD-A228 762 CONTINUED

DESCRIPTORS: (U) *IONOSPHERIC DISTURBANCES, ELECTRON BEAMS, BROADBAND, COUPLING(INTERACTION), DISPERSION RELATIONS, DISTRIBUTION FUNCTIONS, FLIGHT, GROWTH(GENERAL), INJECTION, KINETICS, LANGMUIR PROBES, NARROW BEAMS(RADIATION), PARTICLES, PLASMA WAVES, PLASMAS(PHYSICS), RATES, REACTIVITIES, REPRINTS, SHORT RANGE(TIME), SIMULATION, STABILITY, TEST AND EVALUATION, TIME, VELOCITY.

IDENTIFIERS: (U) Langmuir Plasmas, PE61103D, WUAFOSR3484A2, Langmuir Waves, Electron Foreshock, Time of Flight.

AD-A228 761 20/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Preparation of Pb(x)Ba(1-x)TiO3 and the Effect of the Composition and the Size of the Crystallite on the Crystal Phase,

90 7P

PERSONAL AUTHORS: Saegusa, Kunio; Rhine, Wendell E.; Bowen, H. K.

CONTRACT NO. F49620-89-C-0102

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1061, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Ceramic Transactions, v8 p221-226 1990.

ABSTRACT: (U) Barium lead titanate powder (99.9% pure) was prepared from barium lead titanyl oxalate, which was previously prepared by reacting high-purity ammonium titanyl oxalate with barium and lead acetate. The critical factors in preparing the barium lead titanyl oxalate were pH, the concentration of the solution and the aging time. The critical crystallite size of BaTiO3 powder from the cubic to the tetragonal phase is around 1 microns PbO.3BaO.7Ti)3 powder with an average size of 0.057 microns showed the tetragonal phase. (JS)

DESCRIPTORS: (U) *CRYSTALS, ACETATES, AGING(MATERIALS), AMMONIUM COMPOUNDS, BARIUM, BARIUM TITANATES, LEAD COMPOUNDS, LEAD TITANATES, OXALATES, POWDERS, PURITY, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A228 761

AD-A228 760 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Equatorially Generated ULF Waves as a Source for the Turbulence Associated with Ion Conics,

89 14P

PERSONAL AUTHORS: Johnson, Jay R.; Chang, Tom; Crew, G. B. ; Andre, Mats

CONTRACT NO. F49620-86-C-0128

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1062, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics of Space Plasmas, SPI Conference Proceedings and Reprint Series, n9 p433-445 1989.

ABSTRACT: (U) Low frequency turbulence present on closed field lines in the central plasma sheet has been used to explain ion heating and conic formation with remarkable success. However, the source for the turbulence has yet to be established, and there are no obvious local sources which could power such a broadband spectrum. Alternatively, observations reveal that ion distributions in the equatorial region are often anisotropic, and such distributions excite waves both above and below the proton gyrofrequency. As these wave propagate to lower altitudes where the magnetic field is stronger, their left-hand circularly polarized component resonates with heavy ions. The presence of a parallel gradient in the magnetic field complicates the details of wave propagation, and as a result, downcoming right-hand circularly polarized waves, which acquire a left hand circularly polarized component at the crossover frequency, may tunnel through 'stop zone' to altitudes where they resonant with the ions and thus contribute to the observed ion heating. Reprints. (JHD)

DESCRIPTORS: (U) *IONOSPHERIC DISTURBANCES, *PLASMA WAVES, ALTITUDE, BROADBAND, CIRCULAR, DISTRIBUTION,

AD-A228 760

AD-A228 760 CONTINUED

EQUATORIAL REGIONS, GRADIENTS, HEATING, HEAVY IONS, IONS, LOW ALTITUDE, LOW FREQUENCY, MAGNETIC FIELDS, PARALLEL ORIENTATION, PLASMAS(PHYSICS), POLARIZATION, REPRINTS, SPECTRA, TURBULENCE, ULTRALOW FREQUENCY, WAVE PROPAGATION.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A2, Ion Heating, Ion Conics, Plasma Sheets, Proton Gyrofrequency.

AD-A228 753 5/8

ILLINOIS UNIV AT URBANA DEPT OF PSYCHOLOGY

(U) The Access and Use of Relevant Information: A Specific Case and General Issues,

90 21P

PERSONAL AUTHORS: Ross, Brian H.

CONTRACT NO. AFOSR-89-0447

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1099, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Artificial Intelligence and the Future of Testing, p173-211 1990.

ABSTRACT: (U) The access and use of relevant information is a crucial aspect of cognition. This chapter examines this issue within a research program of how people are reminded of earlier problems during the learning of a cognitive skill. This discussion focusses on using this research to understand broader issues of memory access. In addition, the empirical findings are used to examine individual differences and provide some speculations on how testing may make use of this general idea. Keywords: Remindings, Analogy, Testing, Reprints.

DESCRIPTORS: (U) *MEMORY(PSYCHOLOGY), *ACCESS, *COGNITION, LEARNING, MEMORY DEVICES, REPRINTS, SKILLS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4, Remindings, Indivdiual differences.

AD-A228 751 6/5

NORTHWESTERN UNIV EVANSTON IL COLL OF ARTS AND SCIENCES

(U) Phosphoprotein Regulation of Behavioral Reactivity.

DESCRIPTIVE NOTE: Final technical rept. 30 Sep 86-1 Oct 89,

JUL 90 16P

PERSONAL AUTHORS: Routtenberg, Aryeh

CONTRACT NO. AFOSR-87-0042

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1104, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The regulation of synaptic reactivity by protein kinase C and its substrates has been studied using the long-term potentation paradigm (LTP). We have studied the effects of protein kinase C activators and inhibitors on the durability of synaptic reactivity. The main conclusion to be drawn is that PKC is necessary but not sufficient for the enhanced durability. In combination with a neural signal, however, PKC demonstrates a profound synergism. Synergism is also observed in the analysis of metal ion regulation of PKC activity. Calcium and zinc interact in their effect on the enzyme in a bidirectional manner. Significant accomplishments made during this period were: determining the effect of inhibitors; the study of PKC activators (PDBu and oleate); metal ion regulation of PKC activity; and a second path for PKC activation. Keywords: Synaptic reactivity, Protein kinase, Activators, Inhibitors, Synergism. (js)

DESCRIPTORS: (U) *NERVOUS SYSTEM, ACTIVATION, BEHAVIOR, CALCIUM, CONTROL, ENZYMES, IONS, METALS, OLEATES, PATHS, REACTIVITIES, SIGNALS, SUBSTRATES, SYNAPSIS, SYNERGISM, ZINC.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

AD-A228 751

AD-A228 750 20/2

CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL ENGINEERING AND MATERIALS SCIENCE

(U) The Role of Ledges in Phase Transformations.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-28 Feb 90,

SEP 90 5P

PERSONAL AUTHORS: Aaronson, H. I.

CONTRACT NO. AFOSR-89-0334

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1105, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research workers in many countries and in many different research areas have gradually come to realize that ledges play a central role in the growth of crystals from the vapor, liquid and solid phases. However, the structure of ledges is not easy to study experimentally or to analyze theoretically. Similarly, the kinetics of ledgewise growth pose substantial problems to the experimentalist intent on their measurement and to the theoretician studies attempting to account for these data mathematically. Both experimental and theoretical studies during the three major types of phase transformation enumerated have tended to develop more or less independently of each other. The observation of ledges with TEM and field ion microscopy was discussed with emphasizing methods of distinguishing between ledges and dislocations. One speaker make clear the theoretical as well as the experimental problems involved in making this distinction by referring to certain linear defects displayed in his slides as thingies! This issue has greatly worried us in our recent AFOSR-sponsored research, and it was somewhat of a relief to find that this concern is shared by the best of the experts in the field. However, it is now clear that special efforts must be expended upon making this very important distinction--particularly when the ledges are only a few atomic layers high. (JHD)

AD-A228 750

AD-A228 750 CONTINUED

DESCRIPTORS: (U) *CRYSTAL GROWTH, *DISLOCATIONS, *PHASE TRANSFORMATIONS, DEFECTS(MATERIALS), EXPERIMENTAL DATA, FIELD ION MICROSCOPY, SOLID PHASES, THEORY, VAPORS.

IDENTIFIERS: (U) WUAFOSR2306A1.

AD-A228 749 20/9 20/5

SFA INC LANDOVER MD

(U) Investigation and Modeling of Radiation Absorption Processes and Opacities in Dense Plasmas.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-28 Feb 90,

SEP 90 101P

PERSONAL AUTHORS: Gupta, Uday

REPORT NO. SFA-0184Z

CONTRACT NO. F49620-88-C-0055

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-90-1073

UNCLASSIFIED REPORT

ABSTRACT: (U) A variety of atomic processes contribute to absorption of radiation in dense plasmas. Most existing atomic data are for low density, high temperature plasmas. At high densities and low temperatures, realistic modeling to incorporate the important additional effects in order to generate atomic data in needed. This is addressed in the present work. The models and computer codes developed for the project includes effects of non-linear screening, electron degeneracy, exchange-correlation and ion interactions self-consistently. These were applied to ions of specific configurations in dense plasmas and represent improvements over 'average atom models' often used in dense plasma physics. The focus of this work is mainly on the bound-bound, bound-free and free-free photoprocesses, the contribute to radiation absorption and opacity of dense, low temperature plasmas. We discuss a model to generate ionic distribution that is computationally faster than rate equation method. We also discuss a model to investigate the d.c. electron conduction in dense plasmas, which incorporates effects of multiple scattering and improves over the Ziman type model. These self-consistent models and computer codes are very useful tools to generate large data bases for atomic processes

AD-A228 749 CONTINUED

contributing to radiation absorption and opacities in dense plasmas. Those data would be a useful input to simulation of radiative properties of dense plasmas in various laboratory and astrophysical conditions. (jhd)

DESCRIPTORS: (U) *DENSE GASES, *PLASMAS(PHYSICS), RADIATION ABSORPTION, ASTROPHYSICS, ATOMIC PROPERTIES, ATOMS, COMPUTER PROGRAMS, CONDUCTIVITY, CONFIGURATIONS, CONSISTENCY, DATA BASES, ELECTRONS, EQUATIONS, EXPERIMENTAL DATA, HIGH DENSITY, HIGH TEMPERATURE, IONS, LOW DENSITY, LOW TEMPERATURE, MODELS, NONLINEAR SYSTEMS, RADIATION, RADIATION ABSORPTION, RATES, SCATTERING, SIMULATION.

IDENTIFIERS: (U) Dense Plasmas, WUAFOSR2301A8, PE61102F.

AD-A228 749

AD-A228 747 20/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Numerical Studies of the Structure of Turbulent Shear Flow.

DESCRIPTIVE NOTE: Final rept. Jan 87-Jan 90,

JUL 90 11P

PERSONAL AUTHORS: Orszag, Steven A.

CONTRACT NO. F49620-87-C-0036

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1071, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Renormalization group methods (RNG) have been applied to large eddy simulations of wall regions of channel flows and spectral element RNG simulations of flows in complex geometries were explored. The results predicted wall region streaks accurately at much less spatial resolution than earlier methods. The methods were extended to compressible flows. They have been used to show that the shock region is characterized by large negative values of the divergence indicating tube-like structures. High enstrophy regions reside outside the shock regions. High vorticity regions in incompressible flow tend to be concentrated in tubes, while in compressible flows they tend to be concentrated in sheets. RNG was also applied to k-e modelling of the flow over a backstep. Full simulations were also completed for large Reynolds number turbulence. Keywords: Turbulence, Simulation renormalization group. (JHD)

DESCRIPTORS: (U) *EDDIES(FLUID MECHANICS), *SHEAR PROPERTIES, *TURBULENT FLOW, CHANNEL FLOW, COMPRESSIBLE FLOW, INCOMPRESSIBLE FLOW, NUMERICAL ANALYSIS, REGIONS, RESOLUTION, REYNOLDS NUMBER, SHOCK, SIMULATION, SPATIAL DISTRIBUTION, TURBULENCE, VORTICES, WALLS.

IDENTIFIERS: (U) Renormalization Groups, PE61102F,

AD-A228 747

AD-A228 747 CONTINUED

WUAFOSR2307A2.

AD-A228 746 7/6

RENSSELAER POLYTECHNIC INST TROY NY

(U) New Non-Linear Optical Polymers.

DESCRIPTIVE NOTE: Final rept. 15 May 88-14 Oct 89,

AUG 90 144P

PERSONAL AUTHORS: Gorodisher, Ilya

CONTRACT NO. F49620-88-C-0078

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1070, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Doctoral thesis.

ABSTRACT: (U) New polyurethanes were prepared which exhibit non-linear optical activity. The polymers were poled during synthesis, advantage being taken of the fast polymerization kinetics. Second harmonic generation (SHG) was observed from these polymers. In selected cases, no decrease in the SHF signal (due to depolarization) was observed at room temperature for up to one month. The SHG activity of a series of organic model compounds was also investigated. Keywords: Optical polymers; Polyurethanes; Harmonic generation. (JS)

DESCRIPTORS: (U) *POLYMERIZATION, DEPOLARIZATION, HARMONIC GENERATORS, KINETICS, NONLINEAR SYSTEMS, OPTICAL MATERIALS, OPTICAL PROPERTIES, ORGANIC COMPOUNDS, POLYMERS, POLYURETHANE RESINS, ROOM TEMPERATURE, SIGNALS, SUPERHIGH FREQUENCY, SYNTHESIS.

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F.

AD-A228 542 12/6

SOUTHERN METHODIST UNIV DALLAS TX DEPT OF COMPUTER SCIENCE AND ENGINEERING

(U) Optimization Algorithms for New Computer Architectures with Application to Routing and Scheduling (Year 3).

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Sep 90,

OCT 90 14P

PERSONAL AUTHORS: Kennington, Jeffrey L.; Helgason, Richard V.

REPORT NO. SMU-5-25104D

CONTRACT NO. AFOSR-87-0199

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR, XF
TR-90-1088, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the most important computer architecture innovations to appear in the market place during the last ten years is parallel processing on a shared memory multicomputer. This report presents new algorithms for a variety of network models along with empirical analysis on both sequential and parallel computers. An empirical study on the AT and T KORBX system is also presented. This system uses eight processors each of which has vector capability. Our research program objective is to develop and empirically test new parallel algorithms and software for a wide variety of optimization problems. The problems studied this past year include the shortest path problem, the assignment problem, the semi-assignment problem, the transportation problem, and the generalized network problem. Algorithms for all of these models have been developed and empirically tested on a variety of computers. In addition, we worked with the Military Airlift Command to test the AT&T KORBX system located at Scott Air Force Base. (kr)

DESCRIPTORS: (U) *ALGORITHMS, *COMPUTER ARCHITECTURE,

AD-A228 542

AD-A228 542 CONTINUED

*OPTIMIZATION, AIR FORCE FACILITIES, COMPUTER PROGRAMS, COMPUTERS, EXPERIMENTAL DATA, MEMORY DEVICES, MODELS, NETWORKS, PARALLEL PROCESSING, PATHS, ROUTING, SEQUENCES, TEST AND EVALUATION, TIME SHARING, TRANSPORTATION, VECTOR ANALYSIS, MULTIPROCESSORS, SCHEDULING, COMPUTER NETWORKS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A8.

AD-A228 541 5/8

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF PSYCHOLOGY

(U) Pre-Attentive and Attentive Visual Information Processing.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 87-30 Jun 90,

SEP 90 12P

PERSONAL AUTHORS: Egeth, Howard E.

CONTRACT NO. AFOSR-87-0180

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1118, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research carried out on several interrelated topics is described. These projects are all in the area of visual cognition, and focus on feature and object perception, models of selective attention, and the nature of visual routines such as curve tracing and subitizing. The major thrust of this endeavor has been to explore the nature of visual processes to determine the extent to which they are carried out in parallel or in series. Keywords: Reports/abstracts; Attention /visual perception; Information processing; Vision/cognition; Visual search; Curve tracing. (edc)

DESCRIPTORS: (U) *ATTENTION, *INFORMATION PROCESSING, *VISUAL PERCEPTION, ABSTRACTS, COGNITION, CURVE FITTING, MODELS, REPORTS, SEARCHING, VISION, PATTERN RECOGNITION.

IDENTIFIERS: (U) Feature perception, Subitizing, PE61102F, WUHFOSR2313A4.

AD-A228 540 6/5

ILLINOIS UNIV AT URBANA COLL OF VETERINARY MEDICINE

(U) A Comparative Study Regarding the Association of Alpha-2U Globulin with the Nephrotoxic Mechanism of Certain Petroleum-Baswd Air Force Fuels.

DESCRIPTIVE NOTE: Final rept. 1 Dec 87-30 Jun 90,

SEP 90 15P

PERSONAL AUTHORS: Eurell, Thomas E.

CONTRACT NO. AFOSR-88-0033

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1117, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Fisher 344 males rats have a dose and time-dependent renal proximal tubular degeneration induced by certain hydrocarbon compounds. We have used rat strain variation of the alpha-2U globulin molecule and metabolic alteration of the urinary pH as methods to investigate the hydrocarbon-induced nephrotoxic response. Three significant advances have been made during this project: (1) the development of a histochemical procedure to specifically evaluate decalin-induced changes in the lysosomes of rat renal tubular epithelial cells, (2) the discovery that pigmented male rats demonstrate hydrocarbon-induced nephrotoxicity, and (3) the discovery of a difference in the hydrocarbon-induced nephrotoxicity response of male rats following alteration of the urinary pH. Sodium bicarbonate-induced elevation of the urinary pH markedly altered the lysosomal integrity and morphologic appearance of renal tubular cells in male rats exposed to decalin. (JS)

DESCRIPTORS: (U) *HISTOCHEMISTRY, BIODETERIORATION, CELL STRUCTURE, CELLS, HYDROCARBONS, KIDNEYS, MALES, PH FACTOR, PIGMENTS, RATS, STRAINS(BIOLOGY), TUBULAR STRUCTURES, URINE, VARIATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

AD-A228 540

AD-A227 835 20/4

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Numerical Study of a Three-Dimensional Turbulent Boundary Layer.

DESCRIPTIVE NOTE: Final rept. 1 Jul 87-30 Jun 90,

AUG 90 12P

PERSONAL AUTHORS: Moin, Parviz

CONTRACT NO. AFOSR-87-0285

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1027, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) The effects of transverse strain on an initially two-dimensional turbulent boundary layer are studied in a direct numerical simulation of a planar channel flow with impulsively started transverse pressure gradient. Consistent with experiments in three-dimensional boundary layers, the simulation shows a decrease in the Reynolds shear stress with increasing transverse strain. Also, the directions of the Reynolds shear stress vector and the mean velocity gradient vector were found to differ. In addition, the simulation shows a drop in the turbulent kinetic energy. Terms in the Reynolds stress transport equations were computed. The balances indicate that the decrease in turbulent kinetic energy is a result of a decrease in turbulence production, along with an increase in turbulent dissipation. The effects of the transverse pressure gradient on the instantaneous flow structures were investigated. (jd)

DESCRIPTORS: (U) *NUMERICAL ANALYSIS, *THREE DIMENSIONAL FLOW, *TURBULENT BOUNDARY LAYER, CHANNEL FLOW, DISSIPATION, EQUATIONS, GRADIENTS, KINETIC ENERGY, MATHEMATICAL MODELS, MEAN, MOMENTUM TRANSFER, PLANAR STRUCTURES, PRESSURE GRADIENTS, PRODUCTION, SHEAR

AD-A227 835 CONTINUED

STRESSES, SIMULATION, TRANSPORT PROPERTIES, TRANSVERSE, TURBULENCE, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A227 552 7/2

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Intramolecular Alkene-Oxirane Cycloadditions. Synthesis and Structure of 5-Oxapentacyclo(7.3.0.0(3,7).0(4,12)0.(6,10)Dodecane-2,8-Dione,

90 11P

PERSONAL AUTHORS: Marchand, Alan P.; Reddy, G. M.; Watson, William H.; Kashyap, Ram

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0889, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Tetrahedron, v46 n10 p3409-3418 1990.

ABSTRACT: (U) MCPBA promoted epoxidation of the C(9)-C(10) double bond in endo-tri cyclo-(6.2.1.o(2,7))undeca-4, 9-diene-3, 6-dione (4) followed by intramolecular (2 + 2) photocyclization of the resulting exo epoxide (5) afforded the title compound, 1, in 16% overall yield. The structure of symmetrically hydrated 1 (i.e., la) was determined by single crystal x-ray crystallographic methods. Proton and carbon-13 NMR spectral assignments are given for epoxide 5. Keywords: Intramolecular Alkene oxirane Cycloaddition, Photocycloaddition, X-ray crystal structure, Reprints. (js)

DESCRIPTORS: (U) *CRYSTAL STRUCTURE, EPOXIDATION, EPOXY COMPOUNDS, REPRINTS, SPECTRA, SYNTHESIS, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A227 551 6/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Enantioselective Microbial Asymmetric Reduction of Pentacyclo (5.4.0.0(2,6).0(3,10).0(5,9) Undecane-8,11-Dione,

90 5P

PERSONAL AUTHORS: Marchand, Alan P.; Reddy, G. M.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0891, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Tetrahedron Letters, v31 n13 p1811-1814 1990.

ABSTRACT: (U) Baker's yeast promotes moderately enantioslective but diasterorandom reduction of pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9))undecane-8,11-dione via preferential hydrogen transfer to the exo-Si and endo-Re faces of one of the two C=O groups. Keywords: Pentacyclo(5.4.0.0.(2,6).0(3,10).0(5,9))undecane-8,11-dione; Microbial reduction; Asymmetric reduction; Baker's yeast; Reprints. (js)

DESCRIPTORS: (U) *MICROORGANISMS, ASYMMETRY, HYDROGEN, REDUCTION, REPRINTS, TRANSFER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A227 409 12/1 12/6

GEORGE WASHINGTON UNIV HAMPTON VA JOINT INST FOR ADVANCEMENT OF FLIGHT SCIENC ES

(U) Nonlinear Finite Element Dynamics on Multiprocessor Computers.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-30 Jun 90,

JUL 90 40P

PERSONAL AUTHORS: Noor, Ahmed K.

CONTRACT NO. AFOSR-88-0136

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1033, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A computational procedure is presented for the nonlinear dynamic analysis of unsymmetric structures on vector multiprocessor systems. The procedure is based on novel hierarchical partitioning strategy in which the response of the unsymmetric structure at any time instant is approximated by a linear combination of symmetric and antisymmetric response vectors, each obtained by using only a fraction of the degrees of freedom of the original finite element model. The three key elements of the procedure which result in a high degree of concurrency throughout the solution process are (1) mixed (or primitive variable) formulation with independent shape functions for the different fields; (2) operator splitting or restructuring of the discrete equations at each time step to delineate the symmetric and antisymmetric vectors constituting the response; and (3) two-level iterative process for generating the response of the structure. An assessment is made of the effectiveness of the procedure on the CRAY X-MP/4 computers. Keywords: Parallel processing, Symmetry transformations, Operator splitting, Mixed formulations, Iterative. (KR)

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, *MULTIPROCESSORS, *SYSTEMS ANALYSIS, COMPUTATIONS,

AD-A227 409 CONTINUED

DISCRETE DISTRIBUTION, DYNAMICS, EQUATIONS, FORMULATIONS, FUNCTIONS, ITERATIONS, MATHEMATICAL MODELS, MIXING, NONLINEAR ANALYSIS, NONLINEAR SYSTEMS, OPERATORS(PERSONNEL), PARALLEL PROCESSING, RESPONSE, SHAPE, SOLUTIONS(GENERAL), SPLITTING, SYMMETRY, TRANSFORMATIONS, VECTOR ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A227 372 9/3 9/1 20/12

TEXAS UNIV AT AUSTIN DEPT OF PHYSICS

(U) Picosecond Laser System for High Speed Characterization of Monolithic Devices.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-31 Dec 89,

DEC 89 4P

PERSONAL AUTHORS: Downer,

CONTRACT NO. AFOSR-89-0209

PROJECT NO. 2305, 3842

TASK NO. A3

MONITOR: AFOSR
TR-90-1046

UNCLASSIFIED REPORT

ABSTRACT: (U) Accurate characterization of high-speed electronic circuitry requires the introduction of optical sampling as a method of generating and measuring large electrical bandwidths. The optical sampling techniques that can be employed for measuring the electrical response of a circuit consist of electro-optic sampling 1, 2 and photoconductive switching 3,4. In electro-optic sampling, the fields of a propagating electrical pulse induce a transient birefringence in an electro-optic crystal which, in turn, rotates the polarization of an optical probe pulse transmitted through the crystal. The time resolution of the polarization rotation is an indirect measurement of the time evolution of hte propagating pulse as it passes the crystal. In addition, the crystal can be dipped into the fringing fields of the propagating electrical pulse above the circuit substrate, allowing for high spatial resolution while remaining noncontacting. In photoconductive switching, a small gap between two biased, transmission line conductors laid down on a semiconducting substrate can be electrically closed by an optical pulse focused onto the gap. This results in the generation of an electrical pulse whose shape and duration are determined by the laser pulsewidth, the circuit characteristics of the gap and transmission line and the photo-excited carrier lifetime of the substrate. (rh)

AD-A227 372 CONTINUED

DESCRIPTORS: (U) *LASERS, *LIGHT PULSES, *MONOLITHIC STRUCTURES(ELECTRONICS), *SEMICONDUCTORS, *TRANSMISSION LINES, BIREFRINGENCE, CIRCUITS, CRYSTALS, ELECTRIC CONDUCTORS, ELECTRIC CURRENT, ELECTRICAL PROPERTIES, ELECTRONICS, ELECTROOPTICS, EVOLUTION(GENERAL), HIGH RESOLUTION, MEASUREMENT, METHODOLOGY, OPTICAL EQUIPMENT, OPTICAL PROPERTIES, OPTICS, POLARIZATION, PROBES, PROPAGATION, PULSES, RESOLUTION, RESPONSE, ROTATION, SAMPLING, SPATIAL DISTRIBUTION, SUBSTRATES, TIME, TRANSIENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1, WUAFOSR3842A3.

AD-A227 371 11/2 7/4

TECHNION RESEARCH AND DEVELOPMENT FOUNDATION LTD HAIFA (ISRAEL)

(U) Electrophoretic and Electrolytic Deposition of Ceramic Particles on Porous Substrates.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 89-30 Jun 90,

AUG 90 94P

PERSONAL AUTHORS: Gal-Or, L.; Haber, S.; Liubovich, S.

CONTRACT NO. AFOSR-89-0474

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1047, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Electrophoretic deposition of ceramic particles on porous graphite and their penetration into the pores was demonstrated and studied both theoretically and experimentally/ The theoretical analysis enables to predict the penetration depth of the particles as function of two non-dimensional parameters based on solvent properties, field strength and particle size and concentration. In the experimental studies the amount of induced material was found to increase with the ratio of dielectric constant to viscosity of the solvent, as well as with particle concentration and field intensity. However, due to simultaneous buildup of an overlying deposit penetration as function of deposition time reaches a plateau. In parallel studies on electrolytic deposition, ZrO2 coatings were deposited on porous graphite from an aqueous solution of ZrO(NO3)2. The deposition kinetics and microstructure of the deposit were studied. The initial amorphous deposits transformed into crystalline ZrO2 polymorphs with nanocrystalline dimensions following heat treatment. (RRH)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *ELECTROPHORESIS, *PARTICLE SIZE, *POROUS MATERIALS, AMORPHOUS MATERIALS, CONSTANTS, DEPOSITION, DEPOSITS, DEPTH, DIELECTRIC PROPERTIES, ELECTROLYSIS, EXPERIMENTAL DATA, FIELD

AD-A227 371 CONTINUED

INTENSITY, GRAPHITE, KINETICS, MATERIALS, MICROSTRUCTURE, PARALLEL ORIENTATION, PARAMETERS, PARTICLES, PENETRATION, RATIOS, SOLVENTS, SUBSTRATES, THEORY, TIME, VISCOSITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

AD-A227 368 5/2

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC

(U) Air Force Office of Scientific Research Technical Report Summaries: January-March 1990.

DESCRIPTIVE NOTE: Quarterly rept.,

MAR 90 355P

PERSONAL AUTHORS: Tyrrell, Debra L.

MONITOR: AFOSR, XF
TR-90-0929, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Air Force Office of Scientific Research Technical Report Summaries is published quarterly (March, June, September, and December). It contains a brief summary of each technical report received in the Technical Information Division and submitted to the defense Technical Information Center (DTIC) for that quarter. Two indexes, subject and personal author are provided to help the user locate reports that may be of interest. The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, ANNOUNCEMENT BULLETINS, REPORTS, ABSTRACTS, AIR FORCE EQUIPMENT, AIR FORCE OPERATIONS.

AD-A227 367 5/2

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC

(U) Air Force Office of Scientific Research Technical Report Summaries: April-June 1990.

DESCRIPTIVE NOTE: Quarterly rept.

JUN 90 201P

MONITOR: AFOSR, XF
TR-90-0928, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Air Force Office of Scientific Research Technical Report Summaries is published quarterly (March, June, September, and December). It contains a brief summary of each technical report received in the Technical Information Division and submitted to the Defense Technical Information Center for the quarter. Three indexes, subject, personal author and title are provided to help the user locate reports that may be of interest. The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, ANNOUNCEMENT BULLETINS, REPORTS, ABSTRACTS, AIR FORCE EQUIPMENT, AIR FORCE OPERATIONS.

AD-A227 366 12/9

WASHINGTON UNIV ST LOUIS MO DEPT OF SYSTEMS SCIENCE AND MATHEMATICS

(U) Artificial Intelligence Methods in Pursuit Evasion Differential Games.

DESCRIPTIVE NOTE: Final rept. 1 Jun 87-31 May 90,

JUL 90 219P

PERSONAL AUTHORS: Rodin, Ervin Y.

CONTRACT NO. AFOSR-87-0252

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR, XF
TR-90-0947, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal portion of this Final Report on the present grant, Artificial Intelligence Methods in Pursuit Evasion Differential Games, consists of an attached Technical Report by Rodin and Weil, on Differential Games and Artificial Intelligence in Air Combat. The rest of the report is a brief summary of our activities and achievements under the grant during the past three years. The summary is brief, because it is merely a restatement of reports sent by the P.I. to the AFOSR regularly during the life of the grant. The air of the research here proposed is to develop the conceptual framework and the software for the prototype of an operational, on-board, real time multiprocessing computer system, capable of assisting the pilot in flight and fire control decisions; in other words, a Tactical Decision Aiding Expert System (TDAES). The end product of this research will be for use in theoretical combat planning and analysis; in practical fighter pilot training (e.g., in simulations); and as an actual aid for pilots in support of their tactical decision making diurnal flights. The nature of this research is intelligent control of a very specific type; we intend to combine certain aspects of differential game theory, 3 dimensional computational geometry and artificial intelligence in a unique way, so as to provide a solution to the problem described above.

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(kr)

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, *GAME THEORY, *DECISION AIDS, AERIAL WARFARE, AIR, WARFARE, COMPUTER PROGRAMS, JET FIGHTERS, PILOTS, TRAINING, CONTROL, DECISION MAKING, FIRE CONTROL SYSTEMS, INFLIGHT, EVASION.

IDENTIFIERS: (U) TDAES(Tactical Decision Aiding Expert System).

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A227 365 1/1

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF AEROSPACE ENGINEERING

(U) Control of Unsteady Aerodynamic Forces.

DESCRIPTIVE NOTE: Final rept. 1 May 88-30 Apr 90,

JUL 90 67P

PERSONAL AUTHORS: Ho, Chih-Ming

CONTRACT NO. F49620-88-C-0061

PROJECT NO. 2307

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0924, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aerodynamic properties of an airfoil under unsteady conditions are very different from ones in steady conditions because the vortex generated by unsteady separation greatly modifies the loading on the wing. In this study, a fundamental approach was taken to investigate the lift and the velocity field of unsteady airfoils. Keywords: Airfoil unsteady water channels, Delta wings, Lift, Flow visualization. (Author) (KR)

DESCRIPTORS: (U) *AERODYNAMIC CHARACTERISTICS, *AIRFOILS, *UNSTEADY FLOW, AERODYNAMIC FORCES, DELTA WINGS, FLOW VISUALIZATION, STEADY STATE, VELOCITY, WINGS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A3.

AD-A227 364 20/4

CALIFORNIA UNIV SAN DIEGO LA JOLLA

(U) Investigations of Equilibria, Lattices, and Chatoic Dynamics of 2-D Hamiltonian Point Vortices.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Oct 89,

AUG 90 108P

PERSONAL AUTHORS: Kadtke, James

CONTRACT NO. AFOSR-87-0072

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-0944, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aim of the proposed research effort involved theoretical work, both analytic and numerical, on a number of different problems which were all loosely tied together as involving some aspect of vortex systems, and their relation to chaos in fluid flows. Significant results were obtained during this funding period in several major topics. The first topic which was investigated was a continuation of the author's previous work on vortex lattices. Results consisted of the refinement of the analytic expression for the lattice summation of an infinite lattice of point vortices, and use of this expression to calculate the allowed lattice structures of two-component triangular lattice. It was also shown how these expressions can be used to calculate the bulk physical properties of vortex lattices, by calculating the energy of slip displacement for the triangular lattice. (jhd)

DESCRIPTORS: (U) *VORTICES, LATTICE DYNAMICS, FLUID FLOW, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304K7, Chaos.

AD-A227 307 11/4

UTAH UNIV SALT LAKE CITY DEPT OF MECHANICAL ENGINEERING

(U) Failure in Laminated Composite Plates Containing a Hole.

DESCRIPTIVE NOTE: Final rept. 1987-1990,

JUL 90 72P

PERSONAL AUTHORS: Folias, E. S.

CONTRACT NO. AFOSR-87-0204

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-90-0937

UNCLASSIFIED REPORT

ABSTRACT: (U) Investigation concerns the 3D stresses in a laminated composite plate weakened by a circular hole. The analysis is based on 3D macromechanical considerations. The debonding aspects are investigated between a fiber/matrix interface particularly in the region where the fiber intersects a free edge, e.g., the surface of a hole. The results, which are based on micromechanical considerations, are then used to predict the critical applied load stress which may cause initiation of ply-delamination. Keywords: Composite plates; Laminates. (RH)

DESCRIPTORS: (U) *COMPOSITE STRUCTURES, *LAMINATES, *PLATES, EDGES, STRESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B2.

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AD-A227 308 12/1 12/3 11/4

BROWN UNIV PROVIDENCE RI DIV OF APPLIED MATHEMATICS

(U) Control of Distributed Parameter Systems.

DESCRIPTIVE NOTE: Final rept. 15 Sep 86-20 Sep 89,

AUG 90 51P

PERSONAL AUTHORS: Banks, H. T.

CONTRACT NO. F49620-86-C-0111

PROJECT NO. 3484

TASK NO. A5

MONITOR: AFOSR
TR-90-0927

UNCLASSIFIED REPORT

ABSTRACT: (U) A unified approximation framework for parameter estimation in general linear partial differential equators models has been completed. This framework has provided the theoretical basis for a number of identification problems on which these investigators have made significant progress. These include: (i) nondestructive evaluation techniques of composite materials using thermal probes. (ii) estimation of damping in composite material beams from vibration experiments. In connection with item (ii) it has been shown conclusively that an identification of damping mechanisms in the partial differential equation of a composite beam cannot be accomplished by the use of experimental model analysis. This is a major result in the theory of identifying damping mechanisms in flexible structures. The group has also studied questions related to the determination of irregularities (corrosion, cracks, delaminations, etc.) in composite materials using boundary observations of temperatures after known heat fluxes have been applied to the boundary. Successful efforts using experimental data with the theoretical and computational ideas developed by this group are reported. Substantial progress has been made on the development of a statistical framework (including hypothesis testing algorithms) to use in comparing the suitability of PDE models in least squares fits to data. A number of results on feedback stabilization of distributed parameter model

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have been obtained. (KR)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *NONDESTRUCTIVE TESTING, *PARTIAL DIFFERENTIAL EQUATIONS, *LINEAR DIFFERENTIAL EQUATIONS, ALGORITHMS, BEAMS(STRUCTURAL), BOUNDARIES, COMPOSITE STRUCTURES, CORROSION, CRACKS, DAMPING, DISTRIBUTION, ESTIMATES, EXPERIMENTAL DATA, FEEDBACK, FLEXIBLE STRUCTURES, HEAT FLUX, HYPOTHESES, IDENTIFICATION, LAMINATES, LEAST SQUARES METHOD, MODELS, PARAMETERS, PROBES, PROBLEM SOLVING, STABILIZATION, TEMPERATURE, TEST AND EVALUATION, THERMAL PROPERTIES, VIBRATION.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A5.

AD-A227 305 20/9 20/7 21/3

R AND D ASSOCIATES ALEXANDRIA VA

(U) MPD Thrust Chamber Flow Dynamics.

DESCRIPTIVE NOTE: Final rept. Oct 88-30 Oct 89.

AUG 90 , 46P

CONTRACT NO. F49620-86-C-0117

PROJECT NO. 2308

TASK NO. AT

MONITOR: AFOSR, XF
TR-90-0926, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Flow within the thrust chamber of an MPD arcjet is examined experimentally and modeled with a two-dimensional MHD code. Two quasi-steady MPD thrusters are considered under the same input conditions of current (21 kA) and total mass flow rate (0.006 kg/s, argon + 1.5% hydrogen). The arcjets have the same basic design, consisting of a central cathode, 3.8 cm diameter and 5 cm long, separated from a coaxial anode of equal length by a uniform gap of 2.3 cm. Two different mass injection arrangements are used (100% at mid-radius, and 50% at the cathode base, with the remainder at mid-radius). A new spectroscopic analysis procedure is developed that allows distributions of radial speed, heavy-particle temperature and turbulent speed to be extracted from chordal measurements of light emission by the two species in the plasma flow. Good qualitative (and reasonable quantitative) agreement exists with distributions calculated by the MHD code, indicating that flow within the thrust chamber expands from an electromagnetically-pumped plasma base (vs a pumped jet off the cathode tip). The significant variation of internal flow dynamics with mass injector arrangement implies the need for extensive experimentally-validated code modeling in order to evaluate the potential performance of MPD thrusters. (RRH)

DESCRIPTORS: (U) *MAGNETOHYDRODYNAMICS, *MASS FLOW, *PLASMAS(PHYSICS), *THRUSTERS, ANODES, CATHODES, COAXIAL CONFIGURATIONS, CODING, DISTRIBUTION, DYNAMICS, EMISSION, FLOW, FLOW RATE, INJECTION, INJECTORS, INPUT, INTERNAL,

AD-A227 305 CONTINUED

LENGTH, LIGHT, MASS, SPECTROSCOPY, THRUST CHAMBERS, TURBULENCE, TWO DIMENSIONAL, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1.

AD-A227 304 12/4 22/2 22/5

INTEGRATED SYSTEMS INC SANTA CLARA CA

(U) Adaptive Control of Large Space Structures.

DESCRIPTIVE NOTE: Final rept. 1 Feb 89-31 Mar 90,

AUG 90 39P

PERSONAL AUTHORS: Kosut, Robert L.

REPORT NO. ISI-5877-01

CONTRACT NO. F49620-89-C-0043

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-90-0921

UNCLASSIFIED REPORT

ABSTRACT: (U) Preliminary results are presented for set estimation of uncertain nonlinear systems. Set estimation is a process in an adaptive robust control system which produces a set of models from the measured data. The set is then used in an on-line robust control design to implement a controller which is guaranteed to achieve performance goals for all members on the set. The scheme works whenever the actual system which produced the data is a member of the estimated set. The results of this report extend some previous work in linear set estimation to nonlinear systems. This report also summarizes an analysis of an adaptive nonlinear system using the method of averaging. The aim of adaptive control is to implement in real-time and on-line as many as possible of the design functions now performed off-line by the control engineer. Although it is easy to configure an adaptive system by connecting an estimator and control design rule, research is essential to identify the performance limitations of adaptive strategies for LSS control. The long range goal of this research program is to establish guidelines for selecting the appropriate strategy, to evaluate performance improvements over fixed-gain mechanizations, and to examine the architecture necessary to produce a practical hardware realization. The initial and continuing thrust, however, is to build a strong

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theoretical foundation without losing sight of the practical implementation issues. (KR)

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *SPACECRAFT, *AERONAUTICAL ENGINEERING, ADAPTIVE SYSTEMS, CONTROL, CONTROL SYSTEMS, ENGINEERS, ESTIMATES, LIMITATIONS, LINEARITY, LONG RANGE(DISTANCE), LONG RANGE(TIME), MODELS, NONLINEAR SYSTEMS, SET THEORY, STRATEGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

AD-A227 286 12/7

SOUTHERN METHODIST UNIV DALLAS TX DEPT OF COMPUTER SCIENCE AND ENGINEERING

(U) Efficient Algorithms for the Solution of Problems on Networks in the Parallel Computing Environment.

DESCRIPTIVE NOTE: Final rept. 1 May 89-31 Aug 90,

AUG 90 15P

PERSONAL AUTHORS: Kennington, Jeffery L.; Helgason, Richard V.

CONTRACT NO. F49620-89-C-0109

PROJECT NO. CINC

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1032, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the most important computer architecture innovations to appear in the market place during the last ten years is parallel processing on a shared memory multicomputer. This report presents new algorithms for a variety of network models along with empirical analysis on both sequential and parallel computers. An empirical study on the AT and T KORBX system is also presented. This system uses eight processors each of which has vector capability. Keywords: Military airlift applications, One to one shortest path problem, Parallel algorithms. (Author) (kr)

DESCRIPTORS: (U) *COMPUTER NETWORKS, *MULTIPROCESSORS, AIRLIFT OPERATIONS, ALGORITHMS, COMPUTER ARCHITECTURE, COMPUTERS, EFFICIENCY, ENVIRONMENTS, EXPERIMENTAL DATA, MEMORY DEVICES, MILITARY AIRCRAFT, MILITARY APPLICATIONS, MODELS, PARALLEL PROCESSING, PATHS, SEQUENCES, TIME SHARING, VECTOR ANALYSIS.

IDENTIFIERS: (U) WUAFOSRCINCA1, PE65104D.

AD-A227 276 22/1

MARTIN MARIETTA ASTRONAUTICS GROUP DENVER CO

(U) Large Space Manipulators Study.

DESCRIPTIVE NOTE: Final rept. May 88-May 90,

JUN 90 59P

PERSONAL AUTHORS: Schmitz, Eric; Ramey, Madison

REPORT NO. MCR-90-513

CONTRACT NO. F49620-88-C-0037

PROJECT NO. D812

TASK NO. K1

MONITOR: AFOSR, XF
TR-90-1031, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report documents the research performed for the Large Space Manipulator Study contract. The derivation of nonlinear dynamic models for a simple 3-D articulated, elastic structure is discussed. Kane's dynamics equations are used to obtain equations of motion is closed form; the bending deformations of the elastic links, modelled as slender elastic beams, are described with the assumed-modes method. A 2-D planar version of the dynamic model is used to predict the dynamic behavior of an experimental, articulated two-link elastic structure. Both links consist of thin elastic beams with rectangular cross section. The outer link has a tip payload of variable mass and moment of inertia. The structure is instrumented with position/rate/acceleration/ sensors mounted at the articulations and at the end-point; strain-gauges are mounted along the links at several locations. Close agreement between the analytical predictions and the experimental measurements is documented for modal tests and for slew maneuvers of the structure. The design and implementation of several digital compensators to actively control the single elastic beam as well as the 2-DOF elastic structure are presented. The compensators are obtained using classical design techniques and the Linear Quadratic Gaussian/Loop Transfer Recovery (LQG/LTR) method. (kr)

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AD-A227 276 CONTINUED

DESCRIPTORS: (U) *ELASTIC PROPERTIES, *MANIPULATORS, *SPACE TECHNOLOGY, ACCELEROMETERS, BENDING, COMPENSATORS, CROSS SECTIONS, DEFORMATION, DIGITAL SYSTEMS, DYNAMIC RESPONSE, DYNAMICS, EQUATIONS, EQUATIONS OF MOTION, EXPERIMENTAL DATA, MANEUVERS, MASS, MATHEMATICAL MODELS, MATHEMATICAL PREDICTION, MEASUREMENT, MODELS, MOMENT OF INERTIA, NONLINEAR SYSTEMS, PAYLOAD, POSITION(LOCATION), RATES, RECTANGULAR BODIES, TEST AND EVALUATION, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSRD812K1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

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MARTIN MARIETTA ASTRONAUTICS GROUP DENVER CO

(U) Large Space Manipulators Study.

DESCRIPTIVE NOTE: Final rept. May 88-May 90,

JUN 90 59P

PERSONAL AUTHORS: Schmitz, Eric; Ramey, Madison

REPORT NO. MCR-90-513

CONTRACT NO. F49620-88-C-0037

PROJECT NO. D812

TASK NO. K1

MONITOR: AFOSR, XF
TR-90-1031, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report documents the research performed for the Large Space Manipulator Study contract. The derivation of nonlinear dynamic models for a simple 3-D articulated, elastic structure is discussed. Kane's dynamics equations are used to obtain equations of motion is closed form; the bending deformations of the elastic links, modelled as slender elastic beams, are described with the assumed-modes method. A 2-D planar version of the dynamic model is used to predict the dynamic behavior of an experimental, articulated two-link elastic structure. Both links consist of thin elastic beams with rectangular cross section. The outer link has a tip payload of variable mass and moment of inertia. The structure is instrumented with position/rate/acceleration/ sensors mounted at the articulations and at the end-point; strain-gauges are mounted along the links at several locations. Close agreement between the analytical predictions and the experimental measurements is documented for modal tests and for slew maneuvers of the structure. The design and implementation of several digital compensators to actively control the single elastic beam as well as the 2-DOF elastic structure are presented. The compensators are obtained using classical design techniques and the Linear Quadratic Gaussian/Loop Transfer Recovery (LQG/LTR) method. (kr)

AD-A227 276

AD-A227 276 CONTINUED

DESCRIPTORS: (U) *ELASTIC PROPERTIES, *MANIPULATORS, *SPACE TECHNOLOGY, ACCELEROMETERS, BENDING, COMPENSATORS, CROSS SECTIONS, DEFORMATION, DIGITAL SYSTEMS, DYNAMIC RESPONSE, DYNAMICS, EQUATIONS, EQUATIONS OF MOTION, EXPERIMENTAL DATA, MANEUVERS, MASS, MATHEMATICAL MODELS, MATHEMATICAL PREDICTION, MEASUREMENT, MODELS, MOMENT OF INERTIA, NONLINEAR SYSTEMS, PAYLOAD, POSITION(LOCATION), RATES, RECTANGULAR BODIES, TEST AND EVALUATION, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSRD812K1.

AD-A227 208 11/10

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Reinforcement of Elastomers by the In-situ Generation of Filler Particles,

90 7P

PERSONAL AUTHORS: Mark, James E.; Schaefer, Dale W.

CONTRACT NO. AFOSR-83-0027

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1049, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Materials Research Society Symposia Proceedings, v171 p51-56 1990.

ABSTRACT: (U) The goal of primary interest in these investigations was the development of novel methods for filing elastomeric networks. The techniques developed employ the in-situ generation of reinforcing fillers such as silica or a glassy polymer such as polystyrene either after, during, or before network formation. The reaction involves decomposition of organometallic compounds, using a variety of catalysts and precipitation conditions, or free-radical polymerization of a suitable monomer. The effectiveness of the technique is gauged by stress-strain measurements carried out on these elastomeric composites to yield values of the maximum extensibility, ultimate strength, and energy of rupture. Also of interest are calorimetric studies of the networks, to determine their crystallizability. Information on the filler particles themselves is obtained from density determinations, electron microscopy, and scattering measurements. (RH)

DESCRIPTORS: (U) *ELASTOMERS, *FILLERS, *NETWORKS, *PARTICLES, CALORIMETERS, CATALYSTS, COMPOSITE MATERIALS, DECOMPOSITION, ELECTRON MICROSCOPY, ENERGY, FREE RADICALS, GLASS, MEASUREMENT, ORGANOMETALLIC COMPOUNDS, POLYMERIZATION, POLYMERS, POLYSTYRENE, PRECIPITATION, REINFORCING MATERIALS, RUPTURE, SCATTERING, SILICON DIOXIDE, STRESS STRAIN RELATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A227 193 5/8 6/4

EEG SYSTEMS LAB SAN FRANCISCO CA

(U) Empirical Network Model of Human Higher Cognitive Brain Functions.

DESCRIPTIVE NOTE: Final rept. 1 Apr 87-31 Mar 90,

MAR 90 207P

PERSONAL AUTHORS: Gevins, A. S.; Cutillo, B. A.; Illes, J. ; Bressler, S. L.; Brickett, P. A.

REPORT NO. EEG-88001

CONTRACT NO. F49620-87-C-0047

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-90-1028

UNCLASSIFIED REPORT

ABSTRACT: (U) EEG Systems Laboratory (EEGSL) develops and applies advanced technologies for measuring neurocognitive signals in the human brain. Results during the period 1APR87 to 31MAR90 included: (1) measurement o leading indicator neuroelectric patterns preceding performance decrements in five Air Force fighter test pilots who performed difficult cognitive tasks for 10-14 hours; (2) measurement of split-second neurocognitive patterns of basic linguistic operations which distinguished letter from non-letter, word from non-word, and syntactic from non-syntactic processing; and (3) functional anatomical localization based on 124-channel evoked potential recordings and three dimensional finite-element brain models constructed from magnetic resonance images. Keywords: Cognition, Brain, Sustained mental work, Language EEG, Evoked potentials, MRI, Functional neural networks.

DESCRIPTORS: (U) *COGNITION, *ELECTROENCEPHALOGRAPHY, *MENTAL ABILITY, *PILOTS, BRAIN, DEGRADATION, HUMANS, IMAGES, LABORATORIES, LANGUAGE, LINGUISTICS, MAGNETIC RESONANCE, MODELS, NETWORKS, NEURAL NETS, RECORDING SYSTEMS, JET FIGHTERS, AIR FORCE PERSONNEL.

AD-A227 193 CONTINUED

IDENTIFIERS: (U) Evoked potentials, WUAFORS2313A4, PE61102F.

AD-A227 170 21/4

CASE INST OF TECH CLEVELAND OH

(U) Solid Fuel Combustion.

DESCRIPTIVE NOTE: Final rept. 1 Aug 85-31 Oct 89,

AUG 90 82P

PERSONAL AUTHORS: T'ien, James S.

CONTRACT NO. AFOSR-85-0340

MONITOR: AFOSR, XF
TR-90-0946, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Theoretical analyses were performed on several different types of diffusion flames to study the flame radiation effect. In the first problem, a soot formation and oxidation scheme was incorporated into a turbulent diffusion flame model adjacent to a solid fuel. The computed results for the natural convective fire showed good agreement with experimentally measured solid fuel burning rate. Soot radiation increased its importance with flame height. With flames greater than 1 meter, the radiative heat flux exceeded that by convection. In the second problem, matched asymptotic expansions were employed to study the spherical diffusion flame around a droplet or solid particle with flame radiation. It was found that the importance of radiation increased with droplet radius. The theory predicted that there was a maximum droplet or particle size above which a spherical flame could not be supported due to radiative loss. In the third problem, the thermophoretic motion of small particles (e.g., soot) were studied in a stagnation-point laminar flow next to a heated plate with and without combustion. It was found that both the thermophoretic motion and this Brownian particle diffusion can have a profound effect on the particle concentration distributions. (js)

DESCRIPTORS: (U) *SOLID FUELS, ASYMPTOTIC SERIES, BROWNIAN MOTION, BURNING RATE, COMBUSTION, CONVECTION, DIFFUSION, DROPS, EXPANSION, FIRES, FLAMES, HEAT FLUX, HEIGHT, LAMINAR FLOW, LOSSES, MATCHING, MODELS, MOTION, OXIDATION, PARTICLE SIZE, PARTICLES, RADIANT HEATING, RADIATION, RADIATION EFFECTS, RADIUS(MEASURE), SOLIDS,

SOOT, STAGNATION POINT, THEORY, TURBULENCE.

AD-A227 135 9/3

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Simultaneous Measurements of Velocity, Temperature, and Pressure Using Rapid cw Wavelength-Modulation Laser-Induced Fluorescence of OH,

JUN 90 4P

PERSONAL AUTHORS: Chang, A. Y.; Battles, B. E.; Hanson, R. K.

CONTRACT NO. AFOSR-89-0065

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1051, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In high-speed flows, laser-induced fluorescence (LIF) on Doppler-shifted transitions is an attractive technique for velocity measurement. LIF velocimetry has been applied to combined single-point measurements of velocity, temperature, and pressure and two dimensional imaging of velocity and pressure. Prior to recent research using NO, LIF velocimetry in combustion related flows relied largely on the use of seed molecules. In this letter we report simultaneous, single-point LIF measurements of velocity, temperature, and pressure using the naturally occurring combustion species OH. This experiment is an extension of earlier research in which a modified ring dye laser was used to make time resolved temperature measurements behind reflected shock waves by using OH absorption an in postflame gases by using OH LIF. A pair of fused-silica rhombs mounted on a single galvanonmeter in an intracavity-doubled Spectra-Physics 380 ring laser permit the UV output to be swept continuously over a few wave numbers at an effective frequency of 3kHz. Reprints. (js)

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, ABSORPTION, COMBUSTION, DOPPLER EFFECT, DYE LASERS, FLOW, GASES, HIGH VELOCITY, IMAGES, MEASUREMENT, NUMBERS, OUTPUT, REFLECTION, REPRINTS, RING LASERS, SHOCK WAVES, SYNCHRONISM, TEMPERATURE, TRANSITIONS, TWO DIMENSIONAL,

AD-A227 135 CONTINUED

ULTRAVIOLET RADIATION, VELOCITY, WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A227 073 9/2 17/9

UNIVERSITY OF MANCHESTER INST OF SCIENCE AND TECHNOLOGY (UNITED KINGDOM) DEP T OF PHYSICS

(U) Polarisation Radar Studies of Precipitation: Implementation of the Technique and Data Interpretation.

DESCRIPTIVE NOTE: Final scientific rept. 15 Feb 88-14 Feb 90,

JUL 90 113P

PERSONAL AUTHORS: Illingworth, Anthony J.

CONTRACT NO. AFOSR-88-0121

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-0941, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC/NTIS reproductions will be in black and white.

ABSTRACT: (U) Polarization radar observations provide information on characteristics of precipitation particles not available with conventional weather radar. Observations are reported for four parameters made with the 25m Chilbolton dish the largest steerable meteorological radar in the world. These are the first S-band measurements of the linear depolarisation ratio and the most accurate co- copolar correlations yet reported. Ten publications describe the work in more detail. This report demonstrates how the new parameters can be used to: differentiate ice from water, differentiate the different forms of ice (snow, hail pellets), locate areas where large hail is forming, and identify clouds posing a threat of triggered lightning before natural lightning or breakdown has occurred. Keywords: Polarization radar, Ice, Hail, Raindrops, Bright band, Lightning, Great Britain. (jhd)

DESCRIPTORS: (U) *METEOROLOGICAL RADAR, *POLARIZATION, *PRECIPITATION, *S BAND, *IDENTIFICATION, CLOUDS, DATA

AD-A227 073 CONTINUED

PROCESSING, GREAT BRITAIN, HAIL, ICE, LIGHTNING, MEASUREMENT, PARAMETERS, PARTICLES, PELLETS, RAINDROPS, RATIOS, SNOW, WATER, RADAR SIGNATURES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1, Radar meteorology.

AD-A227 067 21/2 21/8 20/1

ILLINOIS UNIV AT URBANA DEPT OF AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

(U) Effects of Turbulence on Stationary and Nonstationary Processes in C-Systems.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 85-31 Aug 89,

JUL 90 77P

PERSONAL AUTHORS: Beddini, Robert A.; Roberts, Ted A.

REPORT NO. AAE-87-1, UILU-ENG-870501

CONTRACT NO. AFOSR-86-0319

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-0936, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Turbularization of an acoustic boundary-layer (Strokes layer) on impermeable and permeable surfaces is analytically considered. The theoretical approach utilizes a second-order closure model of turbulence. An approximate, closed form solution and a more comprehensive finite difference solution of the time dependent, parabolic, one dimensional governing equations are obtained. For simple acoustic boundary layers on impermeable surfaces, the approximate solution and the numerical results for the critical acoustic Mach number required for turbulent transition are qualitatively confirmed. Calculations for acoustic boundary-layers with transpiration (injection) indicate a substantial reduction for the acoustic Mach number required for transition, up to a frequency dependent limiting injection velocity. The results may provide a practical mechanism for flow related combustion instability in solid propellent rockets, since turbularization of near surface combustion zone could result in relatively low acoustic Mach numbers. An analysis of the transitional and turbulent reactive acoustic boundary layer on a homogenous solid propellant surface investigates potential mechanisms of combustion instability. A new technique is developed for the condensed phase thermal layer, in which the propellant space is mapped onto the gas space and efficiently solved using the same adaptive numerical grid. An acoustic pressure node is obtained in the absence of a mean axial flow.

AD-A227 067 CONTINUED

DESCRIPTORS: (U) *ACOUSTICS, *TURBULENT BOUNDARY LAYER, ADAPTIVE SYSTEMS, AXIAL FLOW, COMBUSTION, COMBUSTION STABILITY, EQUATIONS, FINITE DIFFERENCE THEORY, GRIDS, HOMOGENEITY, LAYERS, MACH NUMBER, MEAN, METHODOLOGY, NEAR FIELD, NODES, NUMERICAL ANALYSIS, PERMEABILITY, SOLID PROPELLANTS, SOLUTIONS(GENERAL), SOUND PRESSURE, SURFACES, THEORY, TRANSITIONS, TRANSPIRATION, TURBULENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1, *Acoustic boundary layer.

AD-A227 048 21/2

CALIFORNIA UNIV BERKELEY DEPT OF MECHANICAL ENGINEERING

(U) Opposed Jet Turbulent Diffusion Flames.

DESCRIPTIVE NOTE: Final rept. 1 Oct 87-31 Mar 90.

SEP 90 68P

PERSONAL AUTHORS: Talbot, L.

CONTRACT NO. AFOSR-88-0011

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1026, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A Hydrogen-Helium mixture was chosen to investigate the structure of a counterflow diffusion flame. Reacting and non reacting conditions were studied at the same Reynolds number. To study the reaction zone structure, high speed tomography based on Mie scattering was employed using a copper vapor laser and a Fastax high speed camera. LDV measurements were also obtained. Different seeding techniques were used to visualize both the turbulent air and fuel jets. The tomographic records were digitized and recorded in a digital computer for statistical treatment. Significant differences in the wrinkle scales between the reacting and non reacting flows were found. A fractal statistical analysis of the tomography records was done to quantify these differences. Seeding of both fuel and air jets provided a mean for the evaluation of the reaction zone thickness. The strain of the reaction zone was obtained from the time resolved tomographic records. Local flame extinction and reignition were observed for different H2/Helium fuel mixtures. Keywords: Turbulent diffusion flames, Rayleigh scattering. (js)

DESCRIPTORS: (U) *JET FLAMES, AIR FLOW, COPPER, DIFFUSION, DIGITAL COMPUTERS, EXTINCTION, FLAMES, FLOW, FUELS, HIGH SPEED CAMERAS, IGNITION, JET FLOW, LASERS, MIE SCATTERING, RAYLEIGH SCATTERING, RECORDS, REYNOLDS NUMBER, SEEDING, STATISTICAL ANALYSIS, THICKNESS,

TOMOGRAPHY, TURBULENCE, VAPORS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A227 045 12/5 20/6

HONEYWELL INC BLOOMINGTON MN PHYSICAL SCIENCES CENTER

(U) Optical Symbolic Processor for Expert System Execution.

DESCRIPTIVE NOTE: Quarterly rept. 1 Jun-31 Aug 86,

AUG 86 16P

PERSONAL AUTHORS: Derstine, Matthew; Guha, Aloke; Ramnarayan, Raja

CONTRACT NO. F49620-86-C-0082

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0930, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the Optical Symbolic Processor for Expert System Execution program is to develop concepts for optical computers which can perform real-time symbolic processing. The program is divided into two sections, architecture development and development of a device for reconfigurable interconnects. In the first quarter of the program, only architecture development work was performed. The approach for this phase of the program has been to examine computational models of computer languages and determine the primitive operations required. Possible optical implementations of these primitives were then examined and evaluated. In general, a top down approach was taken with the goal of a direct optical implementation of the desired primitive operations. It was found that the computational requirements of logic languages and functional languages (Section III) are primitive operations which involve manipulation of complex data structures such as graphs and trees, and that the execution of the languages can be described as manipulations of those data structures. The representation of the complex data structures imply that the representations must be exact (digital) and that some means to denote connections between data items, such as pointers, is required. Since the representation between data items is more important than the actual items stored, the most important functions involve the manipulation of the data structures. (kr)

AD-A227 045 CONTINUED

DESCRIPTORS: (U) *COMPUTER ARCHITECTURE, *EXPERT SYSTEMS, *OPTICAL PROCESSING, COMPUTATIONS, COMPUTERS, DATA BASES, GRAPHS, LANGUAGE, LOGIC, MATHEMATICAL MODELS, OPTICAL EQUIPMENT, OPTICAL PROCESSING, PROCESSING, PROGRAMMING LANGUAGES, REAL TIME, REQUIREMENTS, SYMBOLS, TREES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1.

AD-A227 037 20/5

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) An Efficient Procedure for Calculating the Molecular Gradient, Using SCF-CI Semiempirical Wavefunctions with a Limited Number of Configurations,

90 14P

PERSONAL AUTHORS: Dewar, Michael J.; Liotard, Daniel A.

CONTRACT NO. AFOSR-89-0179

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-90-0982

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Molecular Structure (Theochem) v206 p123-133 1990.

ABSTRACT: (U) An effective procedure is presented for calculating analytical derivatives of the energy in Hartree-Fock-type procedures including configuration interaction in cases where the number of configurations is small. This situation commonly arises in calculations involving semiempirical models such as MNDO or AM1. Existing numerical procedures are unsatisfactory, having been designed for ab initio applications where large numbers of configurations must be included. Reprints. (jhd)

DESCRIPTORS: (U) *MOLECULAR ORBITALS, CONFIGURATIONS, DERIVATIVES(MATHEMATICS), EFFICIENCY, GRADIENTS, INTERACTIONS, MOLECULES, NUMERICAL METHODS AND PROCEDURES, REPRINTS, WAVE FUNCTIONS, HARTREE FOCK APPROXIMATION, MINDO MOLECULAR ORBITALS.

IDENTIFIERS: (U) MNDO Molecular orbitals, AMI Molecular orbitals, AB Initio calculations.

AD-A227 036 20/8

UNIVERSITY OF WESTERN ONTARIO LONDON DEPT OF PHYSICS

(U) Merged Beam Studies of the Dissociative Recombination of H(+3) Ions with Low Internal Energy.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-31 May 86,

APR 86 129P

PERSONAL AUTHORS: Mitchell, J. B.

CONTRACT NO. AFOSR-85-0279

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-90-1022

UNCLASSIFIED REPORT

ABSTRACT: (U) Dissociative recombination and excitation measurements have been performed for H + 3 ions formed under a variety of Source pressures and gas mixtures. At low pressures, an r.f. trap ion source results are lower than previous measurements from a conventional source by a factor of eight. Similar remeasurements are made for H + 3 formed in an rf trap source using a he-ium hydrogen mixture. Ions used for there measurements had an internal energy of lev. Keywords: Ions, Spectroscopy, Nuclear physics. (js)

DESCRIPTORS: (U) *HELIUM, *HYDROGEN, DISSOCIATION, ENERGY, EXCITATION, GASES, INTERNAL, ION SOURCES, IONS, LOW ENERGY, LOW PRESSURE, MEASUREMENT, MIXTURES, NUCLEAR PHYSICS, PRESSURE, RADIOFREQUENCY GENERATORS, RECOMBINATION REACTIONS, SOURCES, SPECTROSCOPY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7.

AD-A227 018 8/10 14/2

CLARKSON UNIV POTSDAM NY DIV OF RESEARCH

(U) Fundamental Penetration Mechanisms of a Flat-Plate in Saturated Clays.

DESCRIPTIVE NOTE: Final rept. 15 Feb 88-23 Aug 90,

AUG 90 249P

PERSONAL AUTHORS: Huang, An-Bin; Bunting, Robert D.; Ahuja, Anurag

CONTRACT NO. AFOSR-88-0114

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-90-1036

UNCLASSIFIED REPORT

ABSTRACT: (U) Flat-plate penetrometers, have become an important part of in situ testing in geotechnical engineering. However, use of flat-plate penetrometers has been highly empirical, mainly due to the lack of knowledge of soil response to the flat-plate penetration. In this project, a numerical technique capable of computing strain paths for three-dimensional penetrometers was developed. A calibration chamber system for cohesive soils and model flat-plates were fabricated. Three dimensional strain path analyses were performed for several of the flat-plate penetrometers currently being used. Results show that flat-plates can induce large strains and strain reversals at levels comparable to those of cone penetration. The characteristics of the strain field during a flat-plate penetration is influenced by both the w/t ratio and the tip apex angle. Regardless of the geometry, the pore pressure and total stress peak at the tip of the penetrometer. The pore pressure and total stress decrease sharply as the soil element passes the tip of the flat-plate. The pore pressure and total stress around the flat-plate do not increase with the plate thickness as some had suggested. For a simple flat-plate (i.e., the flat Marchetti dilatometer), the penetration-induced pore pressure is positively related to the soil rigidity index in the

AD-A227 018 CONTINUED

horizontal direction. The excess pore pressure dissipation around the flat-plate in an anisotropically consolidated clay follows an axisymmetric pattern.

DESCRIPTORS: (U) *PENETROMETERS, *SOIL MECHANICS, *SOIL TESTS, SOILS, PENETRATION, THREE DIMENSIONAL, STRAIN(MECHANICS), REVERSIBLE, CALIBRATION, CLAY, SATURATION, PORE PRESSURE, STRESSES, COMPUTATIONS, STRESS STRAIN RELATIONS.

IDENTIFIERS: (U) Flat plate penetrometers, Geotechnical engineering, Strain reversal, In situ tests, Saturated clay, PE61102F, WUAFOSR2302C1.

AD-A226 997 20/5 9/3

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Planar Laser-Induced Fluorescence Imaging of Shock-Heated Flows in Vibrational Nonequilibrium,

89 9P

PERSONAL AUTHORS: McMillin, B. K.; Lee, M. P.; Palmer, J. L.; Paul, P. H.; Hanson, R. K.

CONTRACT NO. AFOSR-89-0065

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1042, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in FED, v85: Flow Visualization, p55-62 1989.

ABSTRACT: (U) Planar laser induced fluorescence imaging of nitric oxide in nonreacting shock-heated flows with vibrational nonequilibrium is reported. The images obtained provide a means to examine shock structure as well as to visualize and to measure the vibrational nonequilibrium induced by shock waves. The flows were generated within a shock tube with a test gas of 0.5% NO in nitrogen. A narrowband ArF laser tuned to excite transitions in the D from X (0,1) band of NO was used as the excitation source and the resulting broadband fluorescence was collected at 90 deg. using an intensified, 2-D photodiode array camera. Images presented include a normal incident shock; a normal reflected shock; a shock reflected from a nonplanar endwall; and a detached oblique shock formed in supersonic flow over a 2-D wedge. The vibrational relaxation imaged behind the normal incident and reflected shocks was analyzed and compared with calculations based upon relaxation data previously reported. Keywords: Laser, Fluorescence, Imaging, Shock tube, Nonequilibrium, Nitric oxide, Reprints. (jhd)

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, *NITROGEN OXIDES, *SHOCK WAVES, BROADBAND, EXCITATION, FLUORESCENCE,

AD-A226 997 CONTINUED

IMAGES, NARROWBAND, NITROGEN, NONEQUILIBRIUM FLOW, NONPLANAR, PLANAR STRUCTURES, REFLECTION, RELAXATION, REPRINTS, SHOCK, SHOCK TUBES, SOURCES, SUPERSONIC FLOW, MOLECULAR VIBRATION, WALLS.

IDENTIFIERS: (U) Nitric oxides.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI268

AD-A226 996 9/3

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Laser-Induced Fluorescence Imaging of Laser-Ablated Barium,

APR 90 4P

PERSONAL AUTHORS: Cappelli, M. A.; Paul, P. H.; Hanson, R. K.

CONTRACT NO. AFOSR-89-0065

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1044, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Physics Letters, v56 n8 p1715-1717, 30 Apr 90.

ABSTRACT: (U) Laser produced plasmas are now commonly used as atomic sources for thin-film deposition of low vapor pressure solids. The recent demonstration that a two-stage approach to laser ablation can lead to beam focusing and hence significant enhancement in the atomic flux suggests yet a wider range of applications which may now include basic spectroscopy on extremely low vapor pressure transition metals, normally performed with evaporable sources in conventional heat pipe ovens. Our group is now investigating the production of dense ion beams by laser resonance ionization of focused metal vapor atomic beams produced by ablation of barium and strontium. The increased ion and atomic flux densities may now permit studies of charge transfer reactions between colliding beams at volumetric rates much higher than those obtainable from collimated evaporative sources. Reprints. (js)

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, ABLATION, BARIUM, CHARGE TRANSFER, DEPOSITION, EVAPORATION, FOCUSING, HEAT PIPES, IMAGES, ION BEAMS, ION DENSITY, IONIZATION, LASERS, LOW PRESSURE, OVENS, PRODUCTION, REPRINTS, RESONANCE, SOLIDS, SOURCES, SPECTROSCOPY, STAGING, STRONTIUM, THIN FILMS, VAPOR PRESSURE.

AD-A226 996 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A226 995 17/5.1 14/4 9/3

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Image-Intensified Photodiode Array as a Fluorescence Detector in CW-Laser Experiments,

JUL 90 9P

PERSONAL AUTHORS: Hiller, Bernhard; Paul, Phillip H.; Hanson, Ronald K.

CONTRACT NO. AFOSR-89-0065

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1043, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Review of Scientific Instruments, v61 n7 p1808-1815 Jul 90.

ABSTRACT: (U) Imaging systems based on image intensified photodiode array cameras are excellent detectors for laser induced fluorescence experiments in fluid mechanics and combustion science. The principles of operation of such a system are described. Special attention is given to the use of an image intensifier in conjunction with cw-laser experiments. In that mode, ghost images caused by the finite phosphor decay time can contribute major systematic errors. Measurements of the phosphor decay times for exposure times between 0.1 and 100 ms (a typical range for cw-laser experiments) were conducted and show that the decay time increases with exposure time. Methods for circumventing the ghosting problem are suggested. The signal and noise analysis points to analog-to-digital converter noise (ADC) or quantization error of the camera and to photon shot noise as the dominating noise sources. The image intensifier improves time resolution and signal-to-noise ratio (SNR) by moving the system from the camera noise limit to the shot-noise limit. Once the shot-noise limit is reached, the SNR can only be improved by increasing the quantum efficiency of the intensifier, not by increasing the intensifier gain. The spatial resolution of such a system is generally limited by the photodiode array, but can be dominated by

focusing errors, if lenses with low f numbers are used. (JHD)

DESCRIPTORS: (U) *PHOTODIODES, *LASER INDUCED FLUORESCENCE, *IMAGE INTENSIFICATION, *IMAGE INTENSIFIERS(ELECTRONICS), CAMERAS, CONTINUOUS WAVE LASERS, SIGNAL TO NOISE RATIO, REPRINTS, ANALOG TO DIGITAL CONVERTERS, ARRAYS, COMBUSTION, DECAY, ERRORS, EXPOSURE(GENERAL), FLUID MECHANICS, FOCUSING, GAIN, LENSES, LIMITATIONS, NOISE, OPERATION, PHOSPHORS, PHOTONS, QUANTIZATION, QUANTUM EFFICIENCY, RESOLUTION, SHOT NOISE, SOURCES, SPATIAL DISTRIBUTION, TIME, OPTICAL DETECTORS, OPTICAL IMAGES.

IDENTIFIERS: (U) *Photodiode arrays, Phosphor decay, WUAFOSR2308A3, PE61102E.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 994 9/3

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) 2-D Velocity Measurements in Supersonic Flow Using Pulsed Planar Laser-Induced Fluorescence,

89 9P

PERSONAL AUTHORS: Lee, M. P.; Paul, P. H.; Hanson, R. K.

CONTRACT NO. AFOSR-89-0065

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1041, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in FED, v85: Flow Visualization, p101-108 1989.

ABSTRACT: (U) Planar laser induced fluorescence of NO is used to acquire 2 D images of velocity in Mach 7.2 underexpanded jet of N2 seeded with 0.5% NO. NO is excited using a pulsed excimer pumped dye laser at 226. 234 nm pumping the A-X (0,0) Q1(6) line. The resultant fluorescence is imaged with an intensified 240x512 pixel solid state camera. The fluorescence is related to the velocity through the Doppler shift. A simple algorithm is used to extract velocity from the fluorescence images. The velocity data have been compared with correlations and good agreement has been found. This method for molecular velocimetry allows utilization of a laser which is spectrally broad with respect to the absorption line. Sources of error in this technique are discussed. An extension of this technique to single shot simultaneous 2 D measurements of temperature, pressure and two components of velocity is also suggested. Keywords: Laser, Fluorescence, Velocity, Supersonic, Nitric oxide, Reprints. (js)

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, *SUPERSONIC FLOW, ABSORPTION SPECTRA, ALGORITHMS, CAMERAS, DOPPLER EFFECT, ERRORS, FLUORESCENCE, IMAGES, LASERS, LINE SPECTRA, MOLECULES, NITROGEN OXIDES, PLANAR STRUCTURES, PULSES, REPRINTS, SOURCES, SUPERSONIC

AD-A226 994 CONTINUED

CHARACTERISTICS, VELOCIMETERS, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A226 993 7/4

EMORY UNIV ATLANTA GA DEPT OF CHEMISTRY

(U) A Potential Surface for Ar-OH(2Sigma) and Ar-OD(2Sigma) : Fitting and Assigning Experimental Data with Rigorous Theory,

90 5P

PERSONAL AUTHORS: Bowman, Joel M.; Gazdy, Bela; Schafer, Pamela; Heaven, Michael C.

CONTRACT NO. AFOSR-88-0249

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0974, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v94 n6 p2226-2229 1990.

ABSTRACT: (U) We report the results of a large-scale, iteration procedure to assign and fit experimental spectra of Argon compounds. The calculations employed a new multiparameter functional form for the global potential. The parameters were varied randomly, and converged vibrational energies were obtained for each ''trial'' potential. After recognizing an inverse isotope effect, the experimental vibrational/bending energy intervals are accurately reproduced for both Ar-OH and Ar-OD. A preliminary rotational analysis is also in excellent agreement with experiment. Keywords: Physical chemistry. (js)

DESCRIPTORS: (U) *ARGON, *ISOTOPE EFFECT, ENERGY, EXPERIMENTAL DATA, GLOBAL, INVERSION, ITERATIONS, PHYSICAL CHEMISTRY, ROTATION, SPECTRA, SURFACES, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A226 990 6/5

INTERNATIONAL SOCIETY FOR CHRONOBIOLOGY BELTSVILLE MD

(U) International Society for Chronobiology International Conference (19th) Held in Bethesda, Maryland on 20-24 June 1989. Abstracts.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-31 May 90,

JUN 89 98P

PERSONAL AUTHORS: Hayes, Dora K.

CONTRACT NO. AFOSR-89-0336

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1039, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chronobiologia v16 n2 p107-202, Apr-Jun 89.

ABSTRACT: (U) The XIX International Conference on Chronobiology was held in Bethesda, Md. on 20-24 June 1989. Two hundred and thirteen papers were presented covering topics from fundamental research to applications of chronobiological principals to maintaining healthy individuals. The abstracts of the papers presented were published in the April-June 1989 issue of CHRONOBIOLOGIA. That issue constitutes the final report for this project.

DESCRIPTORS: (U) *CHRONOBIOLOGY, SYMPOSIA, REPORTS, ABSTRACTS, BIOLOGICAL RHYTHMS, ANIMALS, HUMANS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 988 9/1 11/2

ULTRASYSTEMS DEFENSE INC IRVINE CA

(U) Heterocycles Based on Group III, IV, and V Elements, Precursors for Novel Glasses and Ceramics.

DESCRIPTIVE NOTE: Final rept. 1 Mar 85-28 Feb 90,

AUG 90 130P

PERSONAL AUTHORS: Paciorek, K. L.; Nakahara, J. H.; Masuda, S. R.; Shih, J. G.; Hoferkamp, L. A.

REPORT NO. SN-3503-F

CONTRACT NO. F49620-85-C-0042

PROJECT NO. 5037

TASK NO. 00

MONITOR: AFOSR, XF
TR-90-0917, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The general objective of this program was to explore the feasibility of synthesizing novel heterocyclics from the group of elements consisting of Boron, Carbon, Nitrogen, Aluminum, Silicon, and Phosphorous, the ultimate goal being the production of processible precursors for novel ceramics of unusual properties. The major efforts under the program were devoted to development of processible preceramic systems leading to aluminum nitride and multi-element nitride ceramics and ceramic materials. Aluminum nitride, in view of its high thermal conductivity, among other considerable properties, is of the interest in electronic applications, in particular in packaging of electronic microcircuits. (js)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *THERMAL CONDUCTIVITY, ALUMINUM COMPOUNDS, BORON, CARBON, ELECTRONICS, FEASIBILITY STUDIES, HETEROCYCLIC COMPOUNDS, HIGH RATE, MICROCIRCUITS, NITRIDES, NITROGEN, PACKAGING, PHOSPHORUS, PRODUCTION, SILICON, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR503700.

AD-A226 988

AD-A226 968 25/4 12/9

JOHNS HOPKINS UNIV BALTIMORE MD

(U) Massively Parallel Network Architectures for Automatic Recognition of Visual Speech Signals.

DESCRIPTIVE NOTE: Final technical rept.,

90 16P

PERSONAL AUTHORS: Sejnowski, Terrence J.; Goldstein, Moise

CONTRACT NO. AFOSR-86-0246

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-0949, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research sought to produce a massively-parallel network architecture that could interpret speech signals from video recordings of human talkers. This report summarizes the project's results: (1) A corpus of video recordings from two human speakers was analyzed with image processing techniques ans used as the data for this study; (2) We demonstrated that a feedforward network could be trained to categorize vowels from these talkers. The performance was comparable to that of the nearest neighbors techniques and to trained humans on the same data; (3) We developed a novel approach to sensory fusion by training a network to transform from facial images to short-time spectral amplitude envelopes. This information can be used to increase the signal-to-noise ratio and hence the performance of acoustic speech recognition systems in noisy environments; (4) We explored the use of recurrent networks to perform the same mapping for continuous speech. Results of this project demonstrate the feasibility of adding a visual speech recognition component to enhance existing speech recognition systems. Such a combined system could be used in noisy environments, such as cockpits, where improved communication is needed. This demonstration of presymbolic fusion of visual and acoustic speech signals

AD-A226 968

AD-A226 968 CONTINUED

is consistent with our current understanding of human speech perception.

DESCRIPTORS: (U) *SPEECH RECOGNITION, *VIDEO SIGNALS, *IMAGE PROCESSING, CLASSIFICATION, PARALLEL PROCESSING, NEURAL NETS, VOWELS, PATTERN RECOGNITION, AUTOMATIC, SPEECH, VIDEO RECORDING, INFORMATION PROCESSING, ACOUSTIC SIGNALS, AUGMENTATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B3.

AD-A226 966 7/4

UTAH UNIV SALT LAKE CITY DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Use of D2 to Elucidate OMVPE Growth Mechanisms.

DESCRIPTIVE NOTE: Final rept. 15 Jun 87-14 Jun 90,

JUL 90 13P

PERSONAL AUTHORS: Stringfellow, G. B.

CONTRACT NO. AFOSR-87-0233

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0950, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research project has successfully determined the reaction mechanisms for the pyrolysis of the group III precursors trimethylgallium (TMGa) and trimethylindium (TMIn) and the grup V precursors AsH3. PH3, trimethylarsine (TMAs), dimethylarsin (DMAs), triethylarsin (TEAs), diethylarsine DEAs), monoethylarsine (MEAs), tertiarybutylarsin (TBAs), and tertiarybutylophospine (TBP). The reaction mechanisms have also been studied for combinations of the group III and group V precursors which result in the production of GaAs and InP. The technique used is mass spectrometry with the pyrolysis occurring in various ambients including H2, He, and D2. The latter allows labelling of reaction mechanisms observed are surprisingly diverse. The pyrolysis temperatures for the various As precursors can be compared. Keywords: Chemical reactions. (JS)

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *PYROLYSIS, GALLIUM ARSENIDES, GROWTH(GENERAL), MASS SPECTROMETRY, PRECURSORS, PRODUCTION, RESPONSE, TEMPERATURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 958 5/7 5/8

HARVARD UNIV CAMBRIDGE MA DEPT OF PSYCHOLOGY

(U) Perception and Temporal Properties of Speech.

DESCRIPTIVE NOTE: Annual technical rept. Jul 89-Jul 90,

JUL 90 67P

PERSONAL AUTHORS: Gordon, Peter C.

CONTRACT NO. AFOSR-89-0461

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-90-0943

UNCLASSIFIED REPORT

ABSTRACT: (U) Two series of experiments are reported on the role of prosody in human speech comprehension. One series looked at the role of prosodic information in listeners' ability to recognize adjacent vowels and consonants cued by the common temporal feature of vowel duration. The stimuli consisted of syllables from a large sample of natural speech which listeners heard with prosodic context or without. Prosodic context was found to aid listeners in correctly attributing the phonological source of vowel duration. The second series of experiments examines the role of stress in syllable accessibility during the on-line comprehension of language and from short-term memory. During on-line comprehension stress is found to interact with lexical processing, while the effect of stress on syllable accessibility from short-term memory is not dependent on lexical effects. Partial contents: Disambiguation of segmental dependencies by extended phonetic context; and coming to terms with stress -- Effects of stress location in sentence processing.

DESCRIPTORS: (U) *SPEECH, *PERCEPTION(PSYCHOLOGY), *COMPREHENSION, AUDITORY PERCEPTION, PHONETICS, TIME DEPENDENCE, STRESSES, VOWELS, SPEECH RECOGNITION, CUES(STIMULI), PSYCHOLOGICAL TESTS, LANGUAGE, MEMORY(PSYCHOLOGY), PSYCHOACOUSTICS.

AD-A226 958 CONTINUED

IDENTIFIERS: (U) Speech comprehension, Prosody, Speech perception, Context effects(speech), Fricatives, Consonants, Listening, PE61102F, WUAFOSR2313A4.

AD-A226 951 12/3

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICAL SCIENCES

(U) Structural Properties of Randomized Times,

APR 85 23P

PERSONAL AUTHORS: Karr, A. F.; Pittenger, A. O.

CONTRACT NO. AFOSR-82-0029

MONITOR: AFOSR, XF
TR-90-1014, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Probability Theory and Related Fields, v72 p395-415 1986.

ABSTRACT: (U) Suppose a measure mu dominates a measure eta in the ordering induced by the excessive functions of a transient Markov process. Rost shows than eta can be represented as the distribution of the process stopped at a randomized optional time and started with initial distribution mu. In this paper we introduce the shift operator to the class of randomized optional times, including the class of randomized quasi-terminal times and that of randomized terminal times. We analyze the algebraic properties of these classes and obtain some compactness results for the class of randomized quasi-terminal times. Some applications, including remplissage by hitting times, are presented. (Author) (kr)

DESCRIPTORS: (U) *MARKOV PROCESSES, *STRUCTURAL PROPERTIES, *TIME STUDIES, ALGEBRA, OPERATORS(PERSONNEL), RANDOM VARIABLES, SHIFTING, TRANSIENTS.

IDENTIFIERS: (U) *Randomized times.

AD-A226 951

AD-A226 919 12/7 12/4

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) A Single Server Queue with Mixed Types of Interruptions.

DESCRIPTIVE NOTE: Rept. for 10 Sep 84-18 Dec 85,

DEC 85 23P

PERSONAL AUTHORS: Nicola, Victor F.

CONTRACT NO. AFOSR-84-0132

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-1011

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Acta Informatica, v23 p465-486 1986.

ABSTRACT: (U) The singer server M/G/1 queue subject to Poisson interruptions has many useful applications in computer systems modeling. The interruptions are usually characterized by their type of service-preemption discipline. This paper deals with this model in its most general setting, allowing the simultaneous presence of all types of interruptions that may be encountered in real systems. In spite of the inherent complexity of the analysis, it is possible to derive analytic closed form expressions for interesting performance measures. The results obtained are of theoretical interest as well as of practical significance. In particular, we derive the Laplace Stieltjes transform of the completion time associated with a customer's service and obtain the steady-state average number of customers in the system. An application to the modeling of checkpointing and recovery in a transactional system is considered. (Author)

DESCRIPTORS: (U) *COMPUTERIZED SIMULATION, COMPUTERS, QUEUEING THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A226 919

AD-A226 918 20/3

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Estimability and Regulability of Linear Systems,

DEC 88 8P

PERSONAL AUTHORS: Baram, Y.; Kailath, T.

CONTRACT NO. AFOSR-88-0327

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-90-0997

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, v33 n12 p1116-1121 Dec 88.

ABSTRACT: (U) A linear state-space system will be said to be estimable if in estimating its state from its output the posterior error covariance matrix is strictly smaller than than the prior covariance matrix. It will be said to be regulable if the quadratic cost of state feedback control is strictly smaller than the cost when no feedback is used. Estimability and regulability are shown to be dual properties, equivalent to the nonreducibility of the Kalman filter and of the optimal linear quadratic regulator, respectively. Keywords: Reprints, Electrical engineering. (Author) (KR)

DESCRIPTORS: (U) *ELECTRICAL ENGINEERING, *SYSTEMS ANALYSIS, CONTROL, COSTS, COVARIANCE, ERRORS, FEEDBACK, KALMAN FILTERING, MATRICES(MATHEMATICS), OPTIMIZATION, QUADRATIC EQUATIONS, QUADRATIC PROGRAMMING, REGULATORS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

AD-A226 917 20/5

TEXAS CHRISTIAN UNIV FORT WORTH DEPT OF PHYSICS

(U) Oxygen Quenching of Positronium in Silica Gels,

APR 90 6P

PERSONAL AUTHORS: Hopkins, B.; Zerda, T. W.

CONTRACT NO. AFOSR-90-0165

MONITOR: AFOSR
TR-90-0996

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics Letters A, v145 n2,3 p141-145, 2 Apr 90.

ABSTRACT: (U) Positronium decay rates have been measured in silica gels of various pore sizes, at two temperatures, 297 and 77 K, and as a function of oxygen concentration. The cross section of positronium quenching due to a monolayer of adsorbed O2 at 77 K is found to be at least two orders of magnitude smaller than the cross section for conversion quenching by subsequent layers, and is similar to that observed in gaseous oxygen. No evidence of chemical quenching has been observed. The positronium 'atom' occurs in two ground states. Parapositronium (p - Ps) is the singlet state with total spin of zero and it has a self annihilation lifetime in vacuum of 0.125 ns, and decays via 2 gamma emission. Orthopositronium (o-Ps) is the triplet state with total spin of one. Its free space lifetime is much longer, 140 ns, and decays via 3 gamma emission. (JS)

DESCRIPTORS: (U) *ATOMS, *POSITRONIUM, ANNIHILATION REACTIONS, CHEMICALS, CONCENTRATION(CHEMISTRY), CONVERSION, CROSS SECTIONS, DECAY, GASES, GELS, GROUND STATE, LIFE SPAN(BIOLOGY), OXYGEN, QUENCHING, RATES, SILICON DIOXIDE, TEMPERATURE.

AD-A226 916 7/4

TEXAS CHRISTIAN UNIV FORT WORTH DEPT OF PHYSICS

(U) Effect of Solvents on the Hydrolysis Reaction of Tetramethyl Orthosilicate,

90 6P

PERSONAL AUTHORS: Zerda, T. W.; Hoang, G.

CONTRACT NO. AFOSR-90-0165

MONITOR: AFOSR, XF
TR-90-0995, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemistry of Materials, v2 n4 p372-376 1990.

ABSTRACT: (U) High-pressure Raman spectroscopy is used to monitor the hydrolysis reaction of tetramethyl orthosilicate, TMOS, in solutions with methanol, acetonitrile, acetone, dioxane and formamide. The rate constants are experimentally determined for different temperatures and pressures. The volume of activation, dielectric constant, and vibrational frequency shifts are experimentally determined and discussed in terms of solvent properties. The acceleration of hydrolysis in formamide is explained in terms of interactions between formamide and TMOS. (JS)

DESCRIPTORS: (U) *HYDROLYSIS, ACCELERATION, ACETONES, ACETONITRILE, ACTIVATION, CONSTANTS, DIELECTRIC PROPERTIES, DIOXANES, FREQUENCY SHIFT, HIGH PRESSURE, INTERACTIONS, METHANOLS, RAMAN SPECTROSCOPY, RATES, RESPONSE, SOLVENTS, VIBRATION, VOLUME.

AD-A226 916

AD-A226 895 20/2

GE AEROSPACE SYRACUSE NY ELECTRONICS LAB

(U) Pseudomorphic InGaAs Materials.

DESCRIPTIVE NOTE: Final rept. Mar 88-Jul 90,

JUL 90 48P

PERSONAL AUTHORS: Ballingall, J. M.; Ho, P.; Martin, P.; Yu, T.

CONTRACT NO. F49620-88-C-0054

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR, XF
TR-90-1037, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this program is to evaluate the dependence of pseudomorphic InxGa1-xAs quality on epitaxial growth conditions and InxGa1-xAs composition. All of the structures were fabricated by molecular beam epitaxy (MBE). The effects of different growth conditions were evaluated with a combination of characterization techniques, including Hall effect, Shubnikov-de Hass, photoreflectance, microwave reflectance, photoluminescence, transmission electron microscopy (TEM), and in-situ reflection high energy electron diffraction (RHEED). Critical layer thickness is shown to be a function of MBE growth temperature. Also, the interruption of InXGa1-xAs growth with a few monolayers of GaAs is shown to smoothen the InxGa1-xAs surface to provide strain relief, substantially extending the critical layer thickness. Modulation enhanced epitaxy is demonstrated to yield high quality pseudomorphic structures at temperatures as low as 300 C. Extensive materials characterization and modeling were applied to the structures, and excellent agreement was often obtained without resorting to adjustable parameters. Keywords: Epitaxy, Pseudomorphic heterostructures, Stained layer superlattices, Dislocations, Photoluminescence, Hall effect, Electron diffraction, Photoreflectance. (JS)

AD-A226 895

AD-A226 895 CONTINUED

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *GALLIUM ARSENIDES, *STRUCTURES, DISLOCATIONS, ELECTRON DIFFRACTION, ELECTRON MICROSCOPY, ENVIRONMENTS, GROWTH(GENERAL), HALL EFFECT, LAYERS, MICROWAVES, MODULATION, MOLECULAR BEAMS, PARAMETERS, PHOTOLUMINESCENCE, REFLECTANCE, TEMPERATURE, THICKNESS, TRANSMITTANCE, YIELD.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1.

AD-A226 893 21/5

PURDUE UNIV LAFAYETTE IN THERMAL SCIENCES AND PROPULSION CENTER

(U) Research as part of the Air Force Research in Aero-Propulsion Technology (AFRAPT) Program.

DESCRIPTIVE NOTE: Final technical rept. 15 Aug 88-14 Oct 90,

AUG 90 5P

PERSONAL AUTHORS: Fleeter, Sanford

CONTRACT NO. AFOSR-88-0261

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0961, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Nine graduate students participated in the AFRAPT Program during this time period. Two students have completed their M.S.M.E. programs and are currently employed at one of the AFRAPT participating companies. Four students have nearly completed their thesis research, with one student having withdrawn. The other two continuing and new students have initiated their thesis research and are making good progress.

DESCRIPTORS: (U) *GAS TURBINES, COMBUSTION, AIR FORCE RESEARCH, RESEARCH MANAGEMENT, STUDENTS, AERONAUTICS, AIR FORCE RESEARCH, PROPULSION SYSTEMS, STUDENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A226 869 12/1 25/2 25/3

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Some Applications of Probability and Statistics in Communication Theory and Signal Processing.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 86-30 Apr 90,

AUG 90 22P

PERSONAL AUTHORS: Wise, Gary L.

CONTRACT NO. AFOSR-86-0026

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-1034, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This Final Technical Report constitutes a summary of the research performed under Grant AFSOR-86-0026 during the period November 1, 1986 through April 30, 1990. First we present a list of the personnel involved in the research effort. Then in the following section we present a brief summary of the research results that have been achieved. Each of these results is well documented in technical articles, and references to these articles are made in the summary of the research results. Keywords: Estimation theory, Martingale convergence theorem. (KR)

DESCRIPTORS: (U) *INFORMATION THEORY, *SIGNAL PROCESSING, *STRUCTURAL ANALYSIS, *COMMUNICATION AND RADIO SYSTEMS, CONVERGENCE, ESTIMATES, PROBABILITY, THEOREMS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR23046, *Applied.

AD-A226 866 7/3

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMISTRY

(U) Cyclic (AlN)n Compounds as Precursors to Aluminum Nitride: Synthesis and Structure of ((CH3)2AlNH2)3 and the Planar Species ((t-C4H9)2AlNH2)3,

89 12P

PERSONAL AUTHORS: Interrante, Lenard V.; Sigel, Gary; Garbauskas, Mary; Hejna, Carolyn

CONTRACT NO. F49620-85-K-0019

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1024, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The crystal and molecular structures of organic compounds, ((CH3) (2 AlNH2)3 1 and ((t-C4 H9) 3 2, have been determined in connection with their investigation as possible precursors to aluminum nitride. Both compounds have an (AlN)3 ring-structure with distorted tetrahedral geometries for the ring Al and N atoms. The distortion from tetrahedral geometry is most pronounced for the N atoms where the endocyclic Al-N-Al bond angles average 125.3 for 1 and 134.2 for 2. The (AlN) 3 ring in 1 is in a skew-boat conformation with no unusual intra- or intermolecular contacts. Compound 2 on the other hand exhibits an unprecedented planar (AlN)3 ring as required by a crystallographic three-fold symmetry axis. Keywords: Ceramic precursor, Aluminum nitride, Dialkylaluminum amides, Crystal structure, Molecular structure. (JS)

DESCRIPTORS: (U) *ORGANIC COMPOUNDS, ALUMINUM COMPOUNDS, AMIDES, ATOMS, CERAMIC MATERIALS, CRYSTAL STRUCTURE, DISTORTION, GEOMETRY, MOLECULAR STRUCTURE, NITRIDES, PLANAR STRUCTURES, PRECURSORS, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A226 865 11/6

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMISTRY

(U) Preparation of Silicon Carbide/Aluminum Nitride Ceramics Using Organometallic Precursors,

FEB 90 7P

PERSONAL AUTHORS: Czekaj, Corinna L.; Hackney, Michael L.; Hurley, William J., Jr.; Interrante, Leonard V.; Sigel, Gary A.

CONTRACT NO. F49620-85-K-0019, N00014-86-K-0770

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1023, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The prospect of alloying SiC with other covalently bonded refractory materials, such as AlN, to achieve microstructural control or alter properties has been previously noted and realized under certain conditions. However because of the high melting points nd low solid-state diffusivities which are characteristic of these materials, currently available ceramic processing methods, such as sintering or hot-pressing, are of limited practical value as a means of obtaining chemically and microstructurally homogeneous materials in useful final form. The influences of the nature of the precursor and processing conditions on the structure, composition, and purity of the SiC/AlN materials are discussed. Keywords: Silicon carbide, Precursors, Aluminum nitride, Solid solutions, Pyrolysis. (JS)

DESCRIPTORS: (U) *ALUMINUM COMPOUNDS, *NITRIDES, *ORGANOMETALLIC COMPOUNDS, *SILICON CARBIDES, BONDING, CERAMIC MATERIALS, CONTROL, HIGH TEMPERATURE, HOMOGENEITY, MATERIALS, MELTING POINT, METHODOLOGY, MICROSTRUCTURE, PRECURSORS, PROCESSING, PURITY, PYROLYSIS, REFRACTORY MATERIALS, SINTERING, SOLID SOLUTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A226 863 13/11 20/8

ROCHESTER UNIV NY DEPT OF CHEMISTRY

(U) Femtosecond Pump-Probe Spectroscopy of Polyatomic Molecules in Condensed Phases,

JUN 90 21P

PERSONAL AUTHORS: Yan, Yi J.; Mukamel, Shaul

CONTRACT NO. AFOSR-90-0054

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-0977, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v41 n11 p6485-6504, 1 Jun 90.

ABSTRACT: (U) A theory for ultrafast pump-probe spectroscopy of large polyatomic molecules in condensed phases is developed. A multimode Brownian oscillator model is used to account for high-frequency molecular vibrations and local intermolecular modes as well as collective solvent motions. A semi-classical picture is provided using the density matrix in Liouville space. The pump field creates a doorway state that propagates for a specified time interval, and the spectrum is calculated by finding its overlap with a window state, prepared by the probe pulse. The doorway and the window states are wave packets in phase space. For high-frequency modes and with long pulses they are expanded in the vibronic eigenstates, whereas for low-frequency modes and with impulsive pulses the Wigner (phase-space) representation is more adequate. Conditions for the observation of quantum beats, spectral diffusion, and solvation dynamics (dynamical Stokes shift) are specified. (JS)

DESCRIPTORS: (U) *POLYATOMIC MOLECULES, *PUMPS, BEAT SIGNALS, BROWNIAN MOTION, CONDENSATION, DIFFUSION, DYNAMICS, HIGH FREQUENCY, LOW FREQUENCY, MODELS, MOLECULAR VIBRATION, MOLECULE MOLECULE INTERACTIONS, MOTION, MULTIMODE, OBSERVATION, OSCILLATORS, OVERLAP, PHASE, PICTURES, PROBES, PULSES, QUANTUM THEORY, SHIFTING,

AD-A226 863 CONTINUED

SOLVATION, SOLVENTS, SPECTRA, TIME INTERVALS, WAVE PACKETS, WINDOWS.

IDENTIFIERS: (U) WUAFOSR2303B3, PE61102F.

AD-A226 862 20/5

AEROCHEM RESEARCH LABS INC PRINCETON NJ

(U) The Role of Ions in Soot Formation,

90 12P

PERSONAL AUTHORS: Calcote, H. F.; Keil, D. G.

CONTRACT NO. F49620-88-C-0007

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0925, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The ionic mechanism of soot formation assumes rapid growth of ions from the chemiion C3H3+ to form increasingly larger ions which either become incipient charged soot particles or combine with electrons (produced in the chemiion step) to produce incipient neutral soot particles. A comparison of the rates of soot formation demonstrates that the rate of ion formation with the rates of soot formation demonstrates that the rate of ion formation exceed the rate of soot formation, and that the rate at which ions disappear is approximately equal to the rate at which soot is formed. In addition, ions are observed to disappear at the same point in the flame at which soot is observed to form. The time it takes to add 10 carbon atoms, i.e., to grow from C10 to C20 species, is compared for the neutral and ionic mechanisms. These times, using experimentally measured species concentrations and typical rate coefficients, are comparable for the two mechanisms. Keywords: Soot formation; Ionic mechanism; Ion-molecule reactions. (JS)

DESCRIPTORS: (U) *IONS, *SOOT, *EVOLUTION(DEVELOPMENT), CHARGED PARTICLES, CHEMICAL REACTIONS, COEFFICIENTS, ELECTRONS, GROWTH(GENERAL), HIGH RATE, MOLECULES, NEUTRAL, PARTICLES, RATES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 861 20/8

EMORY UNIV ATLANTA GA DEPT OF CHEMISTRY

(U) Spectroscopy of the AlAr van der Waals Complex: Rotationally Resolved B 2 Sigma(+) yields X 2 Pi(1/2) Electronic Transitions.

MAR 90 7P

PERSONAL AUTHORS: McQuaid, Michael J.; Gole, James L.

CONTRACT NO. AFOSR-88-0249

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0975, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v92 n5, p2733-2739, 1 Mar 90.

ABSTRACT: (U) Diatomic van der Waals molecules consisting of metal atom bound to a rare gas atom (MRg) have received considerable attention in recent years. Studies of the electronic spectra of these molecules have led to determinations of the interatomic potential energy curves for both ground and electronically excited states. These data are of value as they may be used in the analysis of dynamical events such as collisional line broadening, electronic energy transfer, and molecular beam scattering. Additionally, spectroscopic characterization of these molecules provides a data base against which ab initio and semi-empirical theoretical models of weak bonding interactions may be tested. An interesting property of many MRg molecules in dramatic increase in binding energy, and decrease in the equilibrium internuclear separation, which accompanies electronic excitation. This occurs because bonding in the ground state is predominantly mediated by dispersion forces, while the stability of the excited state may be enhanced by increased metal atom polarizability, partial charge transfer, and orbital overlap effects. (JS)

DESCRIPTORS: (U) *ELECTRON TRANSITIONS, ATOMS, BEAMS(RADIATION), BONDING, CHARGE TRANSFER, DATA BASES,

AD-A226 861 CONTINUED

DYNAMICS, ELECTRON ENERGY, ELECTRONICS, ELECTRONS, ENERGY TRANSFER, EXCITATION, GROUND STATE, INTERACTIONS, LOW STRENGTH, METALS, MODELS, MOLECULAR BEAMS, MOLECULES, NUCLEAR BINDING ENERGY, ORBITS, OVERLAP, POLARIZATION, RARE GASES, SCATTERING, SPECTRA, SPECTROSCOPY, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 860 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Optimally Bounded Score Functions for Generalized Linear Models with Applications to Logistic Regression,

86 13P

PERSONAL AUTHORS: Stefanski, L. A.; Carroll, R. J.; Ruppert, D.

MONITOR: AFOSR, XF
TR-90-0935, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Biometrika, v73 n2 p413-424 1986.

ABSTRACT: (U) We study optimally bounded score functions for estimating regression parameters in a generalized linear model. Our work extends results obtained by Krasker and Welsch (1982) for the linear model and provides a simple proof of Krasker and Welsch's first-order condition for strong optimality. The application of these results to logistic regression is studied in some detail with an example given comparing the bounded-influence estimator with maximum likelihood. Keywords: Reprints. (kr)

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *REGRESSION ANALYSIS, *ESTIMATES, LINEAR SYSTEMS, LINEARITY, LOGISTICS, MAXIMUM LIKELIHOOD ESTIMATION, PARAMETERS, REPRINTS, OPTIMIZATION.

AD-A226 850 7/4

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Comments on a Comparison of AM1 with the Recently Developed PM3 Method,

90 3P

PERSONAL AUTHORS: Dewar, Michael J.; Healy, Eamonn F.; Holder, Andrew J.; Yuan, Yate-Ching

CONTRACT NO. AFOSR-89-0179

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0983, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Computational Chemistry, v11 n4 p541-542 1990.

ABSTRACT: (U) A reparametrized version (PM3) of AM1 has recently been reported and the results for several hundred molecules compared with those from AM1 itself. The comparison implied that PM3 represents a significant improvement over the earlier treatment. The apparently poor performance of AM1 is, however, due to the inclusion of 'AM1' results for elements (Al, P, S) for which AM1 parameters were unavailable. If these are omitted, PM3 is seen to be only marginally better than AM1. Since this conclusion refers only to a specific set of stable molecules, it is not clear whether even this small improvement will apply to other species or studies of reactions. Keywords: Chemical reactions, Inorganic chemistry, Synthesis(Chemistry). (JS)

DESCRIPTORS: (U) *CHEMICAL REACTIONS, INORGANIC CHEMISTRY, MOLECULES, STABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 849 6/5

MISSISSIPPI STATE UNIV MISSISSIPPI STATE DEPT OF BIOLOGICAL SCIENCES

(U) Relationship of Selected Functions of Activated Macrophages.

DESCRIPTIVE NOTE: Final rept. 15 Jun 89-14 Jun 90,

AUG 90 45P

PERSONAL AUTHORS: Pruett, Stephen B.

CONTRACT NO. AFOSR-89-0361

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0940, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this project was to examine relationships of selected metabolic capabilities and key immunological functions of activated marcrophages. Consistent association or a single example of dissociation between two parameters would indicate or eliminate the possibility of common induction pathways or functional interdependence of these parameters. Results indicate that thiol production, capacity to produce H2O2, and tumor cytotoxicity are often induced by the same stimuli, but, in one case, H2O2 production was not affected by stimuli which increased the other two parameters. The commonly accepted idea that highly activated (tumoricidal) macrophages are poor antigen processing and presenting cells was confirmed, but some tumoricidal activity was noted in macrophages which were excellent antigen processing and presenting cells. Keywords: Macrophage, Nitric oxide, Nitrite, Nitrate, Tumor cytolysis, Listeria monocytogenes, Immunotoxicology. (js)

DESCRIPTORS: (U) *MACROPHAGES, ACTIVATION, ANTIGENS, CONSISTENCY, CYTOLOGY, DISSOCIATION, FUNCTIONS, IMMUNOLOGY, INDUCTION SYSTEMS, LISTERIA MONOCYTOGENES, METABOLISM, NEOPLASMS, NITRATES, NITRITES, NITROGEN OXIDES, PARAMETERS, PATHOLOGY, PROCESSING, PRODUCTION,

AD-A226 849 CONTINUED

STIMULI, THIOLS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5, Cytotoxins.

AD-A226 848 5/8

CHICAGO UNIV IL DEPT OF PSYCHOLOGY

(U) Using Memory to Estimate Dates and Locations.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 88-31 Jan 90,

AUG 90 67P

PERSONAL AUTHORS: Huttenlocher, Janellen; Hedges, Larry

CONTRACT NO. AFOSR-88-0125

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-0942, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A model of multi-level coding of spatial location was developed. According to the model people impose categories on homogeneous spaces. In coding location, they report both a particular value and a category value. These values are combined in reporting location. Categories have boundaries which constrain the particular values reported, and particular values are weighted with prototypic central values in estimation. The proposed estimation process, it is shown, increases accuracy, while introducing bias. Four experiments were carried out in which people reported the location of a dot in a circle. The pattern of bias revealed that people imputed horizontal and vertical axes dividing the circle into quadrants. Using the mathematical formulation of the category model, we showed that the model fully explained the pattern of bias observed in the studies. (KR)

DESCRIPTORS: (U) *MEMORY(PSYCHOLOGY), ACCURACY, AXES, BIAS, CODING, ESTIMATES, FORMULAS(MATHEMATICS), HOMOGENEITY, HORIZONTAL ORIENTATION, MEMORY DEVICES, PATTERNS, POSITION(LOCATION), QUADRANTS, SPATIAL DISTRIBUTION, VALUE, VERTICAL ORIENTATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

AD-A226 848

AD-A226 847 7/4

STANFORD UNIV CA

(U) A Pyrolysis Mechanism for Ammonia,

90 25P

PERSONAL AUTHORS: Davidson, D. F.; Kohse-Hoeinghaus, K.; Chang, A. Y.

CONTRACT NO. AFOSR-89-0065

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1045, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. of Chemical Kinetics, v22 p513-535 1990.

ABSTRACT: (U) The mechanism of NH3 pyrolysis was investigated over a wide range of conditions behind reflected shock waves. Quantitative time-history measurements of the species NH and NH2 were made using narrow-linewidth laser absorption. These records were used to establish an improved model mechanism for ammonia pyrolysis. The risetime and peak concentrations of NH and NH2 in this experimental database have also been summarized graphically. Rate coefficients for several reactions which influence the NH and NH2 profiles were fitted in the temperature range 2200 K to 2800 K. Keywords: Ammonia, Kinetics, pyrolysis, Shock tube, Laser absorption. (JS)

DESCRIPTORS: (U) *AMMONIA, *PYROLYSIS, ABSORPTION, COEFFICIENTS, DATA BASES, HISTORY, LASERS, MEASUREMENT, MODELS, RANGE(EXTREMES), RATES, REFLECTION, SHOCK TUBES, SHOCK WAVES, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A226 847

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 846 7/6

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF CHEMISTRY

(U) Influence of Different Organic Side Groups on the Thermal Behavior of Polyphosphazenes: Random Chain Cleavage, Depolymerization, and Pyrolytic Cross-Linking.

90 9P

PERSONAL AUTHORS: Allcock, Harry R.; McDonnell, Gayann S.; Riding, Geoffrey H.; Manners, Ian

CONTRACT NO. AFOSR-89-0234

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0979, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemistry of Materials, v2 n4 p425-432 1990.

ABSTRACT: (U) The thermal behavior of several polyphosphazenes was examined. The polymers were studied by thermogravimetric analysis between 50 and 100 C, by bulk pyrolysis in a tube furnace over the same temperature range, and by thermolysis in a closed system. The volatile products were analyzed by a combination of P NMR spectroscopy, vapor-phase chromatography, and mass spectrometry. Three distinct processes were identified: (1) random chain cleavage of the phosphazene backbone, (2) depolymerization to form small molecule cyclic phosphazenes, and (3) cross-linking reactions to form a network structure. Keywords: Phosphazenes, Polymers, Polyphosphazenes, Thermolysis, Ceramics, Depolymerization. (JS)

DESCRIPTORS: (U) *ORGANIC RADICALS, *PHOSPHAZENE, *THERMAL PROPERTIES, CHAINS, CHEMICAL REACTIONS, CHROMATOGRAPHY, CLEAVAGE, CROSSLINKING(CHEMISTRY), DEPOLYMERIZATION, FURNACES, MASS SPECTROMETRY, MOLECULES, NETWORKS, POLYMERS, PYROLYSIS, RANGE(EXTREMES), SIDES, SPECTROSCOPY, TEMPERATURE, THERMOGRAVIMETRIC ANALYSIS,

AD-A226 846 CONTINUED

VAPOR PHASES, VOLATILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, Polyphosphazene.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 845 20/2

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Modification of DEWAR-PI to Include Ring Strain,

90 10P

PERSONAL AUTHORS: Dewar, Michael J.; Dennington, Roy D., II

CONTRACT NO. AFOSR-89-0179

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0980, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. of Quantum Chemistry, v37 p589-597 1990.

ABSTRACT: (U) Previous work has shown that the heats of unstrained conjugated molecules can be reproduced with surprising accuracy by a semiempirical SCF MO treatment (DEWAR-PI) based on the Pariser-Parr-Pople (PPP) pi SCF Mo Approximation. The original version failed to allow for rising strain. This deficiency has now been remedied in a new version (DEWARPI2). Crystallography. (JS)

DESCRIPTORS: (U) *CRYSTALLOGRAPHY, ACCURACY, MOLECULES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A226 840 20/5

COLUMBIA UNIV NEW YORK

(U) In Situ Kinetics Measurements of Surfactant Adsorption on Colloidal Alumina Using ESR Spectroscopy,

JUL 90 5P

PERSONAL AUTHORS: Malbrel, C. A.; Somasundaran, P.; Turro, N. J.

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0962, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Colloid and Interface Science, v137 n2 p600-603 Jul 90.

ABSTRACT: (U) An electron spin resonance spectroscopy technique is employed to investigate in situ the kinetics of surfactant adsorption on colloidal particles. Using this technique, it was found that 40% of the adsorption of Aerosol OT at the alumina/cyclohexane interface takes place within 5 s after addition of the surfactant to the suspension. Keywords: Surfactant; Macromolecules, Adsorption; Aerosol, Kinetics; Colloidal systems. (jes)

DESCRIPTORS: (U) *SPECTROSCOPY, ADSORPTION, AEROSOLS, ALUMINUM OXIDES, COLLOIDS, CYCLOHEXANES, INTERFACES, KINETICS, MACROMOLECULES, MEASUREMENT, PARTICLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 839 20/13

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) A New Procedure for 'Up-Grading' the Nicalon Polycarbosilane and Related Si-H Containing Organosilicon Polymers,

90 4P

PERSONAL AUTHORS: Seyferth, Dietmar; Sobon, Christine A.; Borm, Jutta

CONTRACT NO. AFOSR-89-0040

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0953, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in New Jnl. of Chemistry, v14 n6/7 p545-547 1990.

ABSTRACT: (U) Photochemical and thermal reactions of small amounts (0.25-2wt%) of polynuclear metal carbonyls (Ru3(CO)12,Fe3)CO12,OS3(CO)12,CO2(CO)8,CO4(CO)12,Rh6(CO)16) serve to cross-link Si-H containing organosilicon polymers. As a result, when the products of these reactions are pyrolyzed, the ceramic residue yields are increased considerably over those obtained with the original polymers. The organosilicon polymers studied most were the Nicalon polycarbosilane and the (CH3SiH)x(CH3SI)y)n polysilane. (js)

DESCRIPTORS: (U) *THERMAL PROPERTIES, METAL CARBONYLS, ORGANIC COMPOUNDS, PHOTOCHEMICAL REACTIONS, POLYMERS, SILICON COMPOUNDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A226 838 7/6

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Borasilazane Polymeric Precursors for Borosilicon Nitride,

JUL 90 4P

PERSONAL AUTHORS: Seyferth, Dietmar; Plenio, Herbert

CONTRACT NO. AFOSR-89-0040

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0954, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Ceramics Society, v73 n7 p2131-2133 Jul 90.

ABSTRACT: (U) The reaction of H3B.S(CH3)2with the (CH3SiHNH)n cyclic oligomers obtained by ammonolysis of methyldichlorosilane (CH3SiHCL2) results in evolution of hydrogen and formation of cross-linked products that contain borazine rings as well as boron atoms that are linked to three nitrogen atoms. Pyrolysis of the products in a stream of argon gives a high yield of a black borosilicon carbonitride, whereas pyrolysis in a stream of ammonia gives white borosilicon nitride in high yield. Keywords: Borosilicates, Boron nitride, Silazanes, Pyrolysis, polymers. (js)

DESCRIPTORS: (U) *POLYMERS, AMMONIA, ARGON, ATOMS, AZINES, BORON, BORON COMPOUNDS, BORON NITRIDES, CROSSLINKING(CHEMISTRY), CYCLES, EVOLUTION(GENERAL), HIGH RATE, HYDROGEN, NITRIDES, NITROGEN, OLIGOMERS, PRECURSORS, PYROLYSIS, RINGS, STREAMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A226 837 7/6

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMISTRY

(U) Preparation of a Polymeric Precursor to Silicon Carbide via Ring-Opening Polymerization: Synthesis of Poly(methylchorosilylene)methylene) and Poly(silapropylene),

89 6P

PERSONAL AUTHORS: Wu, Hui-Jung; Interrante, Leonard V.

CONTRACT NO. AFOSR-89-0439

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0958, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemistry of Materials, v1 n5 p564-568 1989.

ABSTRACT: (U) A high molecular weight linear polycarbosilane has been prepared by ring-opening polymerization of 1,3-dichloro-1,3-dimethyl-1,3-disilacyclobutane. Reduction of this polymer with LiAlH4 yields the corresponding polysilapropylene. The structures of these polymers and their monomeric precursors have been investigated by IR and H, 13C, and 29Si NMR spectroscopy, mass spectra, and GPC. The results of these studies are consistent, in the case of the polymers, with expectations for high molecular weight linear polymers with atactic configurations. The pyrolysis of the high molecular weight poly(silapropylene) was studied by TGA and was found to give a 66% ceramic yield after thermal processing at 400 C, suggesting that this polymer has potential for use as a precursor to SiC ceramics. Keywords: Polycarbonsilane, SiC Precursor, Ring opening, Polymerization, Polysilapropylene. (js)

DESCRIPTORS: (U) *POLYMERS, CERAMIC MATERIALS, CONFIGURATIONS, HEAT, MASS SPECTRA, OPENING(PROCESS), POLYMERIZATION, PRECURSORS, PROCESSING, PYROLYSIS, RINGS, SILICON CARBIDES, SPECTROSCOPY.

AD-A226 837 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 836 20/5

NEW ORLEANS UNIV LA DEPT OF CHEMISTRY

(U) Anomalous Energy Effects Associated with the Presence of Aza Nitrogens and Nitro Substituents in Some Strained Systems,

90 9P

PERSONAL AUTHORS: Murray, Jane S.; Seminario, Jorge M.; Lane, Pat; Politzer, Peter

CONTRACT NO. AFOSR-88-0068

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-0963, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Molecular Structure (Theochem), v207 p193-200 1990.

ABSTRACT: (U) We have used an ab initio SCF molecular orbital approach in conjunction with the isodesmic reaction procedure to investigate anomalous energy effects in strained aza systems and some of their nitro derivatives. The introduction of nitrogens into strained molecular frameworks is found to confer added degrees of stability. IN general this increases with the number opf nitrogens in a series of similar molecules. Further stabilization results from N-nitro substitution and the mononitration of secondary carbons; however the polynitration of systems containing highly strained tertiary carbons has a marked destabilizing effect. Keywords: Ab initio self-consistent-field molecular orbital calculations; Isodesmic reactions; Strained aza systems; Nitro derivatives; Strain energy. (js)

DESCRIPTORS: (U) *MOLECULAR ORBITALS, *MOLECULES, ANOMALIES, CARBON, CHEMICAL DERIVATIVES, ENERGY, NITRO RADICALS, NITROGEN, RESPONSE, SECONDARY, STABILIZATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A226 835 20/5

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Theory of Multicenter Partitioning of Molecular Energies,

JUN 90 8P

PERSONAL AUTHORS: Ewig, Carl S.

CONTRACT NO. AFOSR-86-0146

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-0952, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v92 n11 p6620-6626, 1 Jun 90.

ABSTRACT: (U) The theory of analyzing molecular energies, as found from ab initio computations, in terms of the contributions from specific sets of atoms or centers is discussed. It is shown that the basis-function expansion of molecular wavefunctions in general leads to energetic interactions involving only one- through four-center terms. For the special case of self-consistent-field energies the formulas for the energy terms are given explicitly and several numerical properties are presented, including the differences that arise in chemical reactions. Expressions are also given for the multicenter resolution of correlation energies employing second-order perturbation theory. Keywords: Molecular energies, Perturbation theory, Energy partitioning. (JS)

DESCRIPTORS: (U) *ENERGETIC PROPERTIES, *MOLECULES, ATOMS, COMPUTATIONS, CORRELATION, ENERGY, INTERACTIONS, NUMERICAL METHODS AND PROCEDURES, PERTURBATION THEORY, RESOLUTION, WAVE FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A226 834 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Acidity of Carboxylic Acids: Due to Delocalization or Induction?

AUG 89 4P

PERSONAL AUTHORS: Dewar, Michael J.; Krull, Karen L.

CONTRACT NO. AFOSR-89-0179

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0981, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society, Chemical Communications, n4 p333-334 1990.

ABSTRACT: (U) Calculations for vinylogues of formic acid and vinyl alcohol indicate that their acidities can be explained in terms of resonance stabilization of the conjugate anions, as would be expected in terms of current theory. Keywords: Carboxylic acids, Organic chemistry. (JS)

DESCRIPTORS: (U) *CARBOXYLIC ACIDS, *ORGANIC CHEMISTRY, ACIDS, ANIONS, FORMIC ACID, PH FACTOR, RESONANCE, STABILIZATION, THEORY, VINYL ALCOHOL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A226 833 7/2

EMORY UNIV ATLANTA GA DEPT OF CHEMISTRY

(U) Fluorescence Decay and Non-Radiative Relaxation Dynamics of the A 2 sigma(+) States of OH-Ar and OD-Ar,

APR 90 6P

PERSONAL AUTHORS: Kulk, Sudhir K.; Lin, Yaomin; Heaven, Michael C.

CONTRACT NO. AFOSR-88-0249

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0973, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v167 n6 p597-601, 13 Apr 90.

ABSTRACT: (U) Spectra of the A 2sigma(+) - X 2pi transitions of OH-Ar and OD-Ar have been observed in the gas phase and in cryogenic rare-gas matrices. Laser-induced fluorescence spectra of gas-phase OH/D-Ar showed two distinct vibrational progressions associated with motion of the Argon atom. Rotationally resolved spectra for bands of the lower energy progression revealed contours that were consistent with linear molecules. This progression, which was also observed for matrix-isolated OH/D-ar, has been unambiguously assigned to the OH(D)-Ar stretch mode of the A state. (js)

DESCRIPTORS: (U) *ARGON, ATOMS, CRYOGENICS, DECAY, DYNAMICS, FLUORESCENCE, LASER INDUCED FLUORESCENCE, MATRIX THEORY, MOLECULES, RARE GASES, RELAXATION, SPECTRA, VAPOR PHASES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 832 6/4 5/8

TENNESSEE UNIV MEMPHIS DEPT OF ANATOMY AND NEUROBIOLOGY

(U) Changes in Somatosensory Responsiveness in Behaving Monkeys.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Jul 89-30 Jun 90,

JUL 90 24P

PERSONAL AUTHORS: Nelson, Randall J.

CONTRACT NO. AFOSR-88-0179

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0956, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Four research goals were accomplished: (1) It was determined that sensory responsiveness of primary somatosensory (SI) cortical neurons to vibratory stimuli is quantitatively different depending upon whether monkeys make wrist movements in response to the stimuli or withhold movement. (2) For a special class of SI neurons, it was determined that activity occurring before movement is comprised of a reactivation of the neuron's sensor response and a presumably centrally generated component. (3) It was determined that sensory responsiveness and premovement activity are elevated when behavioral conditions are unpredictable as compared to when they are predictable. (4) It was determined that human subjects can acquire a positional target by wrist movements more quickly if vibratory go-cues are presented in addition to the illumination of a visual signal lamp. The neurophysiological experiments suggest that the responsiveness of SI neurons is profoundly affected by behavioral conditions and an animal's expectation of correct performance. The human psychophysical experiments suggest that the addition of vibratory go-cues to control systems may have benefits without seeming to degrade performance.

DESCRIPTORS: (U) *MOTOR REACTIONS, *REACTION TIME, NERVE CELLS, WRIST, CUES(STIMULI), VIBRATION, RHESUS MONKEYS,

AD-A226 832 CONTINUED

HUMANS, VISUAL SIGNALS, RESPONSE(BIOLOGY), PERFORMANCE TESTS, MODIFICATION, CEREBRAL CORTEX, PERCEPTION, NEUROPHYSIOLOGY, TARGET ACQUISITION, CONTROL SYSTEMS, PSYCHOPHYSICS.

IDENTIFIERS: (U) Somatosensory cortical neurons, Response gating, Cortical neuronal responses, PE61102F, WUAFSOR2312A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 831 9/5

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS INC
PISCATAWAY NJ

(U) Technology Issues in Free-Space Optical Processing.

DESCRIPTIVE NOTE: Final rept. 15 Feb-14 Oct 89,

OCT 89 7P

PERSONAL AUTHORS: Wangemann, Robert T.

CONTRACT NO. AFOSR-89-0257

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0951, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *ELECTROOPTICS, *OPTICAL CIRCUITS, SYMPOSIA, LASER APPLICATIONS, COMPUTER ARCHITECTURE, DYNAMIC RANGE, NEURAL NETS.

IDENTIFIERS: (U) WUAFOSR2305B1, Quantum wells, Photorefractive materials.

AD-A226 830 12/5

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) Experimentation in Software Engineering.

DESCRIPTIVE NOTE: Technical rept.,

NOV 85 38P

PERSONAL AUTHORS: Basili, Victor R.; Selby, Richard W., Jr.; Hutchens, David H.

REPORT NO. CS-TR-1575

CONTRACT NO. F49620-80-C-0001

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0933, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Experimentation in software engineering supports the advancement of the field through an iterative learning process. In this paper we present a framework for analyzing most of the experimental work performed in software engineering over the past several years. We describe a variety of experiments in the framework and discuss their contribution to the software engineering discipline. Some useful recommendations for the application of the experimental process in software engineering are included. Keywords: Software technology measurement and evaluation, Data collection and analysis, Software metrics, Controlled experiment, Experimental design, Empirical study. (KR)

DESCRIPTORS: (U) *EXPERIMENTAL DESIGN, *SOFTWARE ENGINEERING, COMPUTER PROGRAMS, CONTROL, DATA ACQUISITION, ITERATIONS, LEARNING, MEASUREMENT, SUPPORTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2.

AD-A226 829 20/4

CORNELL UNIV ITHACA NY

(U) Unsteady Separation over Maneuvering Bodies.

DESCRIPTIVE NOTE: Final rept. 1 Oct 89-31 Jan 90,

AUG 90 21P

PERSONAL AUTHORS: Shen, S. F.; Wu, T.; Xiao, Z.; Kim, J. S.

CONTRACT NO. AFOSR-88-0229

PROJECT NO. 2307

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0948, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Development of a new boundary layer code has reached the status to permit meaningful applications. Computations have been carried out for the initiation of separation in the symmetry plane of a prolate spheroid of slenderness ratio 1/4, impulsively started into forward motion at zero incidence and also at 50 degrees angle. This case serves as validation by comparing with previously published results of Xu and Wang (ref.1), and also demonstrates that our method gives information of flow near the rear stagnation point not available in the literature. More studies have been performed on the optimization of surface suction to delay or prevent the unsteady separation for an impulsively started circular cylinder. Here the methodology should be of interest. Work on an unsteady three-dimensional thin-layer Navier-Stokes code, however, is progressing slowly. Keywords: Unsteady separation, three dimensional moving body, Separation control. (jhd)

DESCRIPTORS: (U) *FLOW SEPARATION, *UNSTEADY FLOW, BOUNDARY LAYER, COMPUTATIONS, INFORMATION EXCHANGE, MOTION, OPTIMIZATION, STAGNATION POINT, SUCTION, SURFACES, SYMMETRY, THREE DIMENSIONAL, VALIDATION, NAVIER STOKES EQUATIONS, BOUNDARY LAYER CONTROL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A3.

AD-A226 829

AD-A226 828 6/4 23/3

MARYLAND UNIV COLLEGE PARK

(U) Signal Processing and Recognition in Adaptive Neural Networks.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Aug 89-31 Jul 90,

AUG 90 6P

PERSONAL AUTHORS: Shamma, Shihab; Krishnaprasad, P. S.

CONTRACT NO. AFOSR-88-0204

PROJECT NO. 2313

TASK NO. A8

MONITOR: AFOSR, XF
TR-90-0964, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research can be subdivided into four areas: (1) Models and neurophysiology of the auditory cortex. This includes mappings of physiological responses to sound, psychoacoustical studies, and mathematical models of the data. (2) Implementations of the cochlear and other auditory models both in DSP and VLSI forms. (3) Unsupervised learning algorithms applied to problems in sound segmentation, timbre characterization, and pitch extraction. (4) Applications of wavelet transforms to the analysis of neural networks.

DESCRIPTORS: (U) *SIGNAL PROCESSING, *AUDITORY PERCEPTION, NEURAL NETS, ADAPTIVE SYSTEMS, NEUROPHYSIOLOGY, CEREBRAL CORTEX, MATHEMATICAL MODELS, PSYCHOACOUSTICS, COCHLEA LEARNING, ALGORITHMS, AUDITORY SIGNALS, SOUND PITCH, RESPONSE(BIOLOGY), LABORATORY ANIMALS.

IDENTIFIERS: (U) Auditory cortex, PE61102F, WUAFOSR2313A3.

AD-A226 828

AD-A226 827 20/4

MICHIGAN UNIV ANN ARBOR

(U) Drop/Gas Interactions in Dense Sprays.

DESCRIPTIVE NOTE: Annual rept. Aug 89-Aug 90,

AUG 90 6P

PERSONAL AUTHORS: Faeth, G. M.

CONTRACT NO. AFOSR-89-0516

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0959, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Two drop/gas interactions important in the near-injector dense region of sprays are being studied: (1) turbulence modulation, which is the direct generation or modification of turbulence by drop motion, and (2) secondary drop breakup, an important rate-controlling process in dense sprays. Effects of turbulence modulation were measured in homogeneous flows generated by particles falling in stagnant air and water baths. The flow was analyzed with a simple stochastic approach, involving linear superposition of randomly-arriving particle velocity fields. Guided by the theory, unified correlations of turbulence properties were achieved for the measurements. Further progress requires more information about particle wake properties at modest Reynolds numbers in turbulent fields: this is the main focus of current work. Secondary drop breakup is being studied using a shock tube and various drop generators, emphasizing near-limit breakup which is most relevant to dense sprays. Work thus far has concentrated on definition of deformation and shear breakup regimes. This will be followed by study of breakup dynamics and outcomes using holocinematography instrumentation that was recently developed in this laboratory. Keywords: Multiphase flow, Homogeneous turbulence, Drop breakup. (jhd)

DESCRIPTORS: (U) *MULTIPHASE FLOW, *SPRAYS, *TURBULENCE,

AD-A226 827 CONTINUED

*PHOTOGRAPHIC ANALYSIS, AIR, CORRELATION, DEFORMATION, DYNAMICS, FLOW, HIGH DENSITY, HOMOGENEITY, MODULATION, PARTICLES, REYNOLDS NUMBER, SHEAR PROPERTIES, SHOCK TUBES, STAGNATION, STOCHASTIC PROCESSES, WAKE, HOLOGRAPHY, CINEMATOGRAPHY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, Holocinematography.

AD-A226 826 6/4

YALE UNIV NEW HAVEN CT DEPT OF OPHTHALMOLOGY AND VISUAL SCIENCE

(U) Limits of Human Visual Discrimination: Toward a General Model of Visual Geometry.

DESCRIPTIVE NOTE: Final rept. 1 Jan 86-31 Dec 89,

MAR 90 10P

PERSONAL AUTHORS: Hirsch, Joy

CONTRACT NO. AFOSR-86-0077

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0965, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this investigation was to understand the neural computations that mediate the precision of human spatial vision. We approached this goal along three interrelated lines of research: (1) direct investigation of human and monkey retinal sampling mosaics; (2) psychophysical measurements of the precision of human spatial vision; and (3) computer simulations of human visual processes based on 'biologically correct' sampling lattices and 'behaviorally constrained neural models of human spatial information processing.

DESCRIPTORS: (U) *SPACE PERCEPTION, *VISUAL PERCEPTION, PRECISION, PHOTORECEPTORS, RETINA, SAMPLING, PATTERNS, TWO DIMENSIONAL, NEURAL NETS, PSYCHOPHYSICS, MONKEYS, HUMANS, COMPUTERIZED SIMULATION.

IDENTIFIERS: (U) Spatial vision, Webers law, Pe E51102F, WUAFOSR2313A5.

AD-A226 826

AD-A226 825 12/3 9/1

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) Studies in Statistical Signal Processing.

DESCRIPTIVE NOTE: Final rept. 1 Jul 88-30 Jun 90,

JUN 90 34P

PERSONAL AUTHORS: Kailath, Thomas

CONTRACT NO. AFOSR-88-0327

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-0955, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary objective of our research is to develop efficient and numerically stable algorithms for nonstationary signal processing problems by understanding and exploiting special structures, both deterministic and stochastic, in the problems. We also strive to establish and broaden links with related disciplines, such as cascade filter synthesis, scattering theory, numerical linear algebra, and mathematical operator theory for the purpose of cross fertilization have led to new results both in estimation theory and in these other fields, e.g., to new algorithms for triangular and QR factorization of structured matrices, new techniques for root location and stability testing, new realizations for multiple-input/multiple-output (MIMO) transfer functions, and new recursions for orthogonal polynomials on the unit circle and the real line as well as on other curves. (KR)

DESCRIPTORS: (U) *SIGNAL PROCESSING, *STATISTICAL PROCESSES, ALGORITHMS, CIRCLES, ESTIMATES, FILTERS, LINEAR ALGEBRA, MATHEMATICS, NUMERICAL ANALYSIS, OPERATORS(MATHEMATICS), ORTHOGONALITY, POLYNOMIALS, POSITION(LOCATION), SCATTERING, STABILITY, STRUCTURES, SYNTHESIS, TEST AND EVALUATION, THEORY, TRANSFER FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

AD-A226 825

AD-A226 824 6/4

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Demodulation Processes in Auditory Perception.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-30 Nov 89,

MAR 90 6P

PERSONAL AUTHORS: Feth, Lawrence L.

CONTRACT NO. AFOSR-89-0227

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-0966, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall goal of this project is to understand the ability of the human listener to extract information from complex, time-varying sounds such as speech, music or other environmentally important signals. Specifically, we are interested in the listener's ability to process modulations of frequency and amplitude which are thought to carry the information of such signals. This report represents the continuation and extension of work begun at the University of Kansas in 1987. Preliminary work to determine the temporal acuity of normal hearing listeners for spectrally-dynamic signals is complete. Pilot work on processing of frequency transitions in a 'Proving frequency' paradigm has been started; and work on listeners with cochlear hearing impairments has been added to the scope of work undertaken on the project.

DESCRIPTORS: (U) *AUDITORY PERCEPTION, AUDITORY ACUITY, HUMANS, DEMODULATION, AUDITORY SIGNALS, SIGNAL PROCESSING, INFORMATION PROCESSING.

IDENTIFIERS: (U) Listening, PE61102F, WUAFOSR2313A6.

AD-A226 824

AD-A226 823 6/5

PRINCETON UNIV NJ

(U) Bioreactivity: Studies on a Simple Brain Stem Reflex in Behaving Animals.

DESCRIPTIVE NOTE: Final rept. 1 Jun 87-31 May 90,

AUG 90 7P

PERSONAL AUTHORS: Jacobs, Barry L.

CONTRACT NO. AFOSR-87-0301

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0967, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A major problem in attempting to understand complex physiological processes, such as brain neuromodulation, or complex behavioral processes, such as arousal, is finding a simple system that will permit such analyses. The brain stem masseteric (jaw closure) reflex in cats in such a system. It is simple, containing only one synapse in brain, and receives dense inputs from two neurochemical systems important in neuromodulation and arousal. Initial pharmacologic studies showed that locally applied norepinephrine facilitated the reflex response. More importantly, physiologic conditions, known to activate the brain norepinephrine system, also facilitated the response. This latter finding was shown to be causal, rather than correlative, by a study which found that the facilitation could be blocked by prior destruction of the norepinephrine input specifically tp the reflex circuitry. These data represent the first definitive example of an activational effect in an intact and behaving organism being attributable to a particular central neurotransmitter acting at a specific brain site. (js)

DESCRIPTORS: (U) *BRAIN, *NEUROTRANSMITTERS, ANIMALS, BEHAVIOR, CATS, CIRCUITS, CLOSURES, INPUT, MOUTH, NEUROCHEMISTRY, NOREPINEPHRINE, PHARMACOLOGY, PHYSIOLOGY, REFLEXES, RESPONSE, SITES, SYNAPSE, VASOMOTOR REFLEXES.

AD-A226 823

AD-A226 823 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

AD-A226 822 17/5 9/3 20/6

ARIZONA STATE UNIV TEMPE DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Research on Certain Aspects of Laser Diffraction Particle Size Analysis Relevant to Autonomous Self-Diagnosing Instrumentation.

DESCRIPTIVE NOTE: Final rept. 1 Oct 84-31 May 90,

JUL 90 24P

PERSONAL AUTHORS: Hirleman, E. D.

CONTRACT NO. AFOSR-84-0187

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0972, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The results of a multi-year research effort addressing fundamental scientific issues relevant to the application of laser diagnostic methods as on-line sensors in next-generation propulsion systems are summarized. The overall objective of this research effort was to contribute to the scientific knowledge base necessary to characterize and then extend the capabilities of near-forward scattering (laser-diffraction) particle sizing techniques in terms of application as intelligent sensors capable of on-line, autonomous, and self-diagnosing operation in hostile propulsion system environments. The project scope encompassed three research areas: (1) steering or deflection of the probe laser beam due to refractive index (temperature or concentration) gradients, (2) inverse scattering algorithms, and (3) multiple scattering and measurements in optically thick media. The important technical contributions of this project included: development and demonstration of a concept which allows on-line configuration of optimal detector arrays using transmission-mode spatial light modulators and which can obviate the beam steering problem; derivation of the optimal scaling law for Fraunhofer diffraction particle sizing systems which integrated the

AD-A226 822 CONTINUED

optical detector array geometry and the inversion software; systematic formulation and synthesis of the family of integral transform solutions to the inverse Fraunhofer diffraction particle sizing problem and development of a new integral transform; development of a radiation transfer model for near-forward scattering by optically-thick particle media; and development of a general solution and technique for solving the inverse scattering problem for optically-thick dispersions of particles large compared to the wavelength. (jhd)

DESCRIPTORS: (U) *DIAGNOSTIC EQUIPMENT, *LASER APPLICATIONS, *LIGHT SCATTERING, ADVERSE CONDITIONS, ALGORITHMS, ARRAYS, BEAM STEERING, COMPUTER PROGRAMS, CONFIGURATIONS, DEFLECTION, DIAGNOSIS(GENERAL), FORMULATIONS, GEOMETRY, INVERSE SCATTERING, INVERSION, LASER BEAMS, LASERS, METHODOLOGY, MODELS, ONLINE SYSTEMS, OPTICAL DETECTORS, OPTICAL EQUIPMENT, OPTIMIZATION, PARTICLE SIZE, PROBES, PROPULSION SYSTEMS, RADIATIVE TRANSFER, REFRACTIVE INDEX, SCALING FACTOR, SOLUTIONS(GENERAL), SYNTHESIS.

IDENTIFIERS: (U) *Laser diagnostics, Fraunhofer diffraction.

AD-A226 822

AD-A226 816 21/3 20/9 9/3

OHIO STATE UNIV COLUMBUS DEPT OF AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

(U) IR and FIR Laser Diagnostics for Plasma Thrusters Using a CW CO2 Radiation Source.

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Apr 90,

JUL 90 42P

PERSONAL AUTHORS: York, Thomas M.

CONTRACT NO. AFOSR-89-0297

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1030, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The accomplishments during this contract period have been related to the development of a multi-beam interferometer system, which would utilize a CO2 laser system for high sensitivity, to eventually be used to diagnose plasma in the electromagnetic expansion region of a plasma thruster. Since the application of interest is a 1/4 Scale MPD experiment, funded by NASA, where plasma is poorly known, the CO2 laser interferometer will first be tested with a single beam on a DC discharge experiment whose plasma characteristics are well known. That experiment has been assembled and tested. The CO2 laser system has been tested and found to be satisfactory. Keywords: Carbon dioxide lasers, Plasma Diagnostics, Plasma thrusters. (jhd)

DESCRIPTORS: (U) *INTERFEROMETERS, *PLASMA DIAGNOSTICS, *PLASMA ENGINES, *LASER BEAMS, CARBON DIOXIDE LASERS, DIAGNOSIS(GENERAL), DIRECT CURRENT, ELECTROMAGNETISM, EXPANSION, FAR INFRARED RADIATION, HIGH SENSITIVITY, LASER APPLICATIONS, MULTIPLE BEAMS(RADIATION), PLASMAS(PHYSICS), REGIONS, THRUSTERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1, Plasma thrusters.

AD-A226 816

AD-A226 815 7/2

BRISTOL UNIV (UNITED KINGDOM) DEPT OF INORGANIC CHEMISTRY

(U) Heteronuclear Metal Cluster Compounds Synthesis and Reactivity.

DESCRIPTIVE NOTE: Final rept. Mar 86-Jul 90,

AUG 90 22P

PERSONAL AUTHORS: . Stone, F. G.

CONTRACT NO. AFOSR-86-0125

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0960, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This Final Report describes the synthesis and characterisation of compounds containing metal-metal bonds between dissimilar transition elements. The new compounds reported included species with chains or rings of metal atoms, involving tungsten or molybdenum bonded to the elements nickel, platinum, rhodium, or iridium. The Report also describes numerous mixed-metal compounds in which the metal-metal bonds are bridged by the carbaborane group C2B9H9R2 (R = H or Me). A variety of unprecedented molecular structures have been identified by X-ray crystallographic studies. Keywords: Cluster compounds of platinum, Nickel, Molybdenum, Tungsten, Rhodium, Iridium, Iron, Ruthenium, Gold. (Js)

DESCRIPTORS: (U) *CLUSTERING, *METAL METAL BONDS, ATOMS, CHAINS, CRYSTALLOGRAPHY, GOLD, IRIDIUM, IRON, MOLECULAR STRUCTURE, MOLYBDENUM, NICKEL, PLATINUM, REACTIVITIES, RHODIUM, RINGS, RUTHENIUM, SYNTHESIS, TRANSITION METALS, TUNGSTEN, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A226 809 20/10

SCIENTIFIC RESEARCH ASSOCIATES INC GLASTONBURY CT

(U) Studying Quantum Phase-Based Electronic Devices.

DESCRIPTIVE NOTE: Final rept. 20 May 87-14 Jun 90,

AUG 90 107P

PERSONAL AUTHORS: Grubin, H. L.; Cahay, M.; Kreskovsky, J. P.

REPORT NO. SRA/R90-910023-F

CONTRACT NO. F49620-87-C-0055

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0923, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A study was undertaken to examine, theoretically, quantum phase-based electronic device. The study was implemented through examination of moments of the Wigner Distribution Function, time dependent solutions to Schrodingers equation in two dimensions and solutions to the equation of motion of the Density Matrix. Solutions were obtained using numerical methods. A variety of problems were considered including simulation of resonant tunneling structures, electron diffraction through an aperture in a potential well, and examination of the Aharanov-Bohm effect. (rrh)

DESCRIPTORS: (U) , DISTRIBUTION FUNCTIONS, ELECTRON DIFFRACTION, EQUATIONS, MOMENTS, NUMERICAL METHODS AND PROCEDURES, RESONANCE, SIMULATION, SOLUTIONS(GENERAL), STRUCTURES, TIME DEPENDENCE, TUNNELING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

AD-A226 795 12/3

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Correspondence of Canonical and Microcanonical Rate Constants Using Variational Transition State Theory for Simple Bond Fissions,

JUL 90 10P

PERSONAL AUTHORS: Schranz, Harold W.; Raff, Lionel M.; Thompson, Donald L.

CONTRACT NO. AFOSR-89-0085

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-0969, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v171 n1,2 p68-76, 27 Jul 90.

ABSTRACT: (U) The efficient evaluation of microcanonical and canonical variational transition state rate constants by Markov sampling techniques is discussed. It is well known that, in the evaluation of canonical rate constants, sampling the full phase space of the system is unnecessary and that an equivalent and far more efficient procedure is to perform a Markov walk over configuration space. It is shown that an analogous improvement in efficiency is possible in the case of microcanonical rate constants. The close relationship of canonical and microcanonical average is observed. Keywords: Reprints. (Author) (RH)

DESCRIPTORS: (U) *RATES, *SAMPLING, *TRANSITIONS, CONSTANTS, EFFICIENCY, REPRINTS, THEORY.

IDENTIFIERS: (U) WUAFOSR2303B3, PE61102E.

AD-A226 795

AD-A226 794 20/13

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Accuracy in Ab Initio Reaction-Energy Computations. 1. Compounds of First-Row Elements,

90 18P

PERSONAL AUTHORS: Van Wazer, John R.; Kello, Vladimir; Hess, B. ., Jr.; Ewig, Carl S.

CONTRACT NO. AFOSR-86-0146

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-0968, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v94 n15 p5604-5710 1990.

ABSTRACT: (U) Ab initio enthalpy computations were carried out for over 40 gas-phase diamagnetic molecules, including 18 hydrocarbons. All employed optimized geometries, a wide range of basis sets and a series of electron correlation approximations based on perturbation theory (through MP4SDTQ) and the coupled-cluster model (through CCSDT). The energies of forming the various molecules from the nuclei and electrons were calculated from experimental data and compared with the various ab initio values. The enthalpies at 298K of chemical reactions between molecules were considered in terms of the disagreement between the experimental and theoretical enthalpies, with emphasis on generic classes of reactions. The generic reactions showed up regularities in disagreements between theory and experiment. Reasons for occasional large disagreement were probed. Keywords: Reaction energy, Enthalpies, Electron correlation, Thermodynamics. (JS)

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *ENTHALPY, *THERMODYNAMICS, ACCURACY, APPROXIMATION(MATHEMATICS), COMPUTATIONS, CORRELATION, ELECTRONS, ENERGY, EXPERIMENTAL DATA, MOLECULES, NUCLEI, OPTIMIZATION, PERTURBATION THEORY, RANGE(EXTREMES), RESPONSE.

AD-A226 794

AD-A226 794 CONTINUED

IDENTIFIERS: (U) WUAFOSR2303B3, PE61102F.

AD-A226 793 12/6 5/1

ARIZONA STATE UNIV TEMPE DEPT OF MATHEMATICS

(U) (DURIP) Exploring and Controlling Spatio Temporal Chaos Under Complex Structures through Visualization: A Mini-Supercomputer Approach.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-30 Nov 89,

NOV 89 4P

PERSONAL AUTHORS: Trotter, William T.

CONTRACT NO. AFOSR-89-0155

PROJECT NO. 3842

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1035, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the AFOSR DURIP Grant was to assist the Mathematics Program at ASU in acquiring equipment for an Advanced Graphics Computing Facility. Our computers have made possible a breakthrough in unravelling the topology and geometry of some critical phenomena in turbulence, which closely blend chaotic dynamics with classical moderate turbulence. Interactive graphics visualization enabled us to describe the qualitative global nature of numerical solutions and interpret key features from the huge volume of numerical output. (Author) (kr)

DESCRIPTORS: (U) *INTERACTIVE GRAPHICS, *APPLIED MATHEMATICS, *VISUAL PERCEPTION, COMPUTERS, DYNAMICS, FACILITIES, NUMERICAL ANALYSIS, OUTPUT, SOLUTIONS(GENERAL), STRUCTURES, TOPOLOGY, TURBULENCE, VOLUME.

IDENTIFIERS: (U) WUAFOSR3842A5, PE61104D, *Minisupercomputers, *Visualization.

AD-A226 792 11/4

TORONTO UNIV (ONTARIO) DEPT OF CHEMICAL ENGINEERING AND APPLIED CHEMISTRY

(U) Mesomechanical Model for Fibre Composites.

DESCRIPTIVE NOTE: Annual progress rept. 1 Jul 89-31 May 90,

JUL 90 21P

PERSONAL AUTHORS: Piggott, Michael R.

CONTRACT NO. AFOSR-89-0365

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1040, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Carbon fibre interfaces with epoxy resins have been examined using the pull out method. This method can now be reliably and reproducibly used to measured the bond strength. Shear strengths can be very high, up to nearly 150 MPa in individual experiments, with average values for 50 or more tests of up to 100 MPa. The strengths are little different for Hercules AS1, AS2 and AS4. The sizing appears to have little effect (but this needs to be confirmed). The strengths observed are up to three times the shear strength of the polymer. Carbon and glass interfaces with thermoplastics (polyethylene and nylon) can also be measured using this method. Results here are up to four times the estimated shear strength of the polymer. To explain the high results an equivalent work of fracture is involved. This has never exceeded 300 Jm-2, indicating that the interphases are quite brittle. Keywords: Fibre reinforces polymers, Composites. (js)

DESCRIPTORS: (U) *FIBER REINFORCED COMPOSITES, BONDING, CARBON, CARBON FIBERS, EPOXY RESINS, ESTIMATES, FRACTURE(MECHANICS), GLASS, INTERFACES, NYLON, POLYETHYLENE, POLYMERS, SHEAR STRENGTH, STRENGTH(MECHANICS), THERMOPLASTIC RESINS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

AD-A226 792

AD-A226 791 21/2

CALIFORNIA INST OF TECH PASADENA

(U) Investigation of Combustion in Large Vortices.

DESCRIPTIVE NOTE: Final rept. Sep 86-Sep 89,

AUG 90 13P

PERSONAL AUTHORS: Zukoski, Edward E.,

CONTRACT NO. AFOSR-84-0286

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1038, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research consists of an experimental study of the time dependent combustion in vortex structures. Large vortices were formed utilizing pulsed flow over a downstream facing step. The technique for simultaneous shadowgraph, chemiluminescence, and laser doppler velocimeter measurements has been developed and is used regularly. For a pressure oscillation of fixed amplitude, the diameter of the vortex grows linearly with time at a rate that increases linearly with the pressure amplitude of the oscillation generating the vortex formation. The onset of chemiluminescence - and we believe combustion - is delayed for several milliseconds, close to our estimates for the chemical time for the systems under study here. Keywords: Vortex burning, Unsteady combustion, Shock enhanced mixing, Supersonic combustion, Hypersonic ramjet. (jhd)

DESCRIPTORS: (U) *SUPERSONIC COMBUSTION, *VORTICES, AMPLITUDE, CHEMILUMINESCENCE, DOPPLER SYSTEMS, FLOW, HYPERSONIC VEHICLES, LASER VELOCIMETERS, MEASUREMENT, OSCILLATION, PRESSURE, PULSES, RAMJET ENGINES, SPARK SHADOWGRAPH PHOTOGRAPHY, STRUCTURAL PROPERTIES, SYNCHRONISM, TIME DEPENDENCE, VARIABLE PRESSURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, Hypersonic ramjet engines.

AD-A226 791

AD-A226 790 20/12

CORNELL UNIV ITHACA NY

(U) Ultra High Speed Compound Semiconductors and Real Time Signal Processing.

DESCRIPTIVE NOTE: Final rept. 1 May 88-30 Apr 90,

JUN 90 16P

PERSONAL AUTHORS: Krusius, J. P.

CONTRACT NO. F49620-87-C-0044

PROJECT NO. 2305

TASK NO. A9

MONITOR: AFOSR, XF
TR-90-0914, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report is the final report on research conducted under the auspices of the Joint Services Electronics Program at Cornell University. The research is grouped under two themes: (a) ultra high speed compound semiconductors, and (b) real time signal processing. Results on OMVPE materials growth, femtosecond laser probing of hot carriers, and ensemble Monte Carlo simulations are reported on under the first theme. Accomplishments on VLSI algorithms, fault tolerant architectures, and architectures with multiple functional units for signal processing are given under the second theme. (rh)

DESCRIPTORS: (U) , ALGORITHMS, ARCHITECTURE, CHARGE CARRIERS, FAULTS, GROWTH(GENERAL), HIGH ENERGY, LASERS, MATERIALS, MONTE CARLO METHOD, PROCESSING, REAL TIME, SIGNAL PROCESSING, SIMULATION, TIME SIGNALS, TOLERANCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305A9.

AD-A226 789 9/5 12/9

BDM INTERNATIONAL INC MCLEAN VA

(U) Analog Optical Neural Nets: A Noise Sensitivity Analysis.

DESCRIPTIVE NOTE: Annual rept. (Final) 21 Jul 89-20 Jul 90,

AUG 90 41P

PERSONAL AUTHORS: Haney, Michael W.; Levy, James J.; Athale, Ravindra A.

REPORT NO. BDM/MCL-90-0757-TR

CONTRACT NO. F49620-89-C-0115

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0915, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Neural networks represent a promising alternative to traditional artificial intelligence approaches. The developement of analog optical implementations of neural networks such as the multilayer perceptron with learning by backward error propagation (BEP) requires an understanding of the noise sensitivity of such architectures. The objective of this program is to study the effects of component and system noise on the performance of such optical implementations. The method used is computer simulation. In this first phase of the program, the one-hidden layer perceptron with back propagation was simulated using a simplified, device-independent noise model. The results point to a distinct noise threshold above which the learning mechanism is corrupted. The efficiency of learning based on variations within back propagation on the initializing method was also studied. In the next phase, a device-dependent noise model will be used. To this end a plausible all-optical architecture capable of both the forward pass and backward error propagation steps of training data presentation has been proposed. Author (kr)

AD-A226 789 CONTINUED

DESCRIPTORS: (U) *ANALOG SYSTEMS, *NEURAL NETS, *NOISE ANALYZERS, *OPTICAL PROPERTIES, APPROACH, ARTIFICIAL INTELLIGENCE, COMPUTERIZED SIMULATION, LEARNING, NOISE, PROPAGATION, SENSITIVITY, THRESHOLD EFFECTS, TRAINING.

IDENTIFIERS: (U) WUAFOSR2305B1.

AD-A226 789

AD-A226 788 5/8

OREGON UNIV EUGENE DEPT OF PSYCHOLOGY

(U) Investigating Individual Differences in General Comprehension Skill: The Role of Suppression and Enhancement.

DESCRIPTIVE NOTE: Final technical 1 Apr 89-1 Apr 90,

AUG 90 69P

PERSONAL AUTHORS: Gernsbacher, Morton A.

CONTRACT NO. AFOSR-89-0305

PROJECT NO. 2313

TASK NO. A7

MONITOR: AFOSR
TR-90-0945

UNCLASSIFIED REPORT

ABSTRACT: (U) Investigation into whether the cognitive mechanism of suppression underlies differences in adult comprehensions skills are reported. Less-skilled comprehenders less-efficiently reject the inappropriate meaning of ambiguous words (e.g., the playing card vs garden tool meaning of spade), the incorrect forms of homophones (e.g., patients vs patience), the highly-typical-but-absent members of scenes (e.g., tractor in a farm scene), and words superimposed on pictures of pictures surrounding words. however, less-skilled comprehenders are not less cognizant of what is contexually appropriate, in fact, they benefit from a biasing context just as much (and perhaps more) as more-skilled comprehenders do. So, comprehenders do no have difficulty enhancing contexually appropriate information. Instead, it is suggested that less-skilled comprehenders suffer from less-efficient suppression mechanism, which we conclude is an important component of general comprehension skill. (sdw)

DESCRIPTORS: (U) *COGNITION, *COMPREHENSION, *SKILLS, PICTURES, SHOVELS, SUPPRESSION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A7, Individual differences.

AD-A226 788

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI268

AD-A226 787 20/6

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATERIALS SCIENCE AND ENGINEERIN G

(U) Investigation of New Semiinsulating Behavior of III-V Compounds.

DESCRIPTIVE NOTE: Final technical rept. 16 Aug 86-28 Feb 90,

FEB 90 50P

PERSONAL AUTHORS: Lagowski, Jacek

CONTRACT NO. AFOSR-86-0342

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0939, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Study of transition metal impurities have defined direct effects associated with deep donor/acceptor levels acting as compensating centers. Electrical and optical properties of vanadium and titanium levels were determined in GaAs. The experimental data provided basis for the verification of chemical trends and defined compositional range for III-V mixed crystals whereby semiinsulating behavior can be achieved using transition elements deep levels and a suitable codoping with shallow donor/acceptor impurities. (Js/Js)

DESCRIPTORS: (U) *GROUP III COMPOUNDS, *OPTICAL PROPERTIES, CHEMICALS, COMPENSATION, COMPOSITION(PROPERTY), CRYSTALS, ELECTRICAL PROPERTIES, ELECTRON ACCEPTORS, EXPERIMENTAL DATA, GROUP V COMPOUNDS, IMPURITIES, MIXING, PATTERNS, SHALLOW DEPTH, TITANIUM, TRANSITION METALS, VANADIUM, VERIFICATION.

IDENTIFIERS: (U) Review.

AD-A226 786 6/5

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF PSYCHIATRY

(U) Extrathalamic Modulation of Cortical Function.

DESCRIPTIVE NOTE: Final technical 1 pr 89-31 Mar 90,

JUL 90 11P

PERSONAL AUTHORS: Foote, Stephen L.

CONTRACT NO. F49620-87-C-0038

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0920, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall goal of these studies is to characterize the effects of noradrenergic (NA) afferents on cortical information processing. Our previous studies indicate that the primate locus coeruleus (LC) system, originating in the pontine brainstem, innervates neocortex more densely than previously thought, exhibiting highly specific patterns in terms of the regional and laminar distribution of its axons across the neocortex. Previous neurophysiological observations suggest that this highly divergent system imposes state-related modulatory effects on thalamo-cortical and cortico-cortical systems. For example, we have shown that primate LC-NA neurons are more active during waking than sleep and exhibit bursts of activity during increases in attentiveness. Keywords: Locus coeruleus, noradrenergic, Event-related potential. (js)

DESCRIPTORS: (U) *NERVE FIBERS, DISTRIBUTION, LAMINAR FLOW, LOCUS, NEUROPHYSIOLOGY, PATTERNS, PRIMATES, SLEEP.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

AD-A226 785 9/1 20/12

PURDUE UNIV LAFAYETTE IN SCHOOL OF ELECTRICAL ENGINEERING

(U) Investigation of a New Concept in Semiconductor Microwave Oscillators.

DESCRIPTIVE NOTE: Final rept. 1 May 85-30 Apr 90,

JUN 90 19P

PERSONAL AUTHORS: Cooper, James A., Jr

CONTRACT NO. AFOSR-85-0193

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR, XF
TR-90-0971, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have investigated a new type of millimeter wave oscillator device based on a resistive gate MESFET structure. The resistive gate establishes a uniform electric field in the regime of negative differential mobility for electrons in GaAs. At these fields, dipolar charge domains form in the channel and drift into the drain, producing microwave oscillations in the drain current. In the contiguous domain mode, a continuous sequence of charge domains forms throughout the channel. This mode is possible because the resistive gate screens the self-induced fields of each dipolar domain, keeping the field outside the domain unperturbed. Frequencies up to 100+ Ghz are predicted, independent of channel length, and the frequency should be tunable over at least one octave by varying the gate-to-source voltage. This mode has not yet been observed experimentally, since the gate resistivity on our prototype devices has been too large. These devices are presently operating a single domain transit time mode, producing oscillations in the 6 to 28 GHz range for channel lengths from 5 to 20 micron. Work is continuing to reduce the gate resistivity so that the contiguous domain mode can be observed. (rrh)

DESCRIPTORS: (U) *CHANNELS, *DIPOLES, *DRAINAGE, *DRIFT, *MICROWAVE OSCILLATORS, *RESISTANCE, *SEMICONDUCTORS,

AD-A226 785 CONTINUED

ELECTRIC FIELDS, ELECTRONS, GATES(CIRCUITS), LENGTH, MICROWAVES, MILLIMETER WAVES, MOBILITY, OSCILLATION, OSCILLATORS, PROTOTYPES, SEQUENCES.

IDENTIFIERS: (U) WUAFOSR2305C1.

AD-A226 784 9/1 12/6

BOSTON UNIV MA COLL OF ENGINEERING

(U) Sensor Based Control of Robotic Mechanisms.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-31 May 90,

AUG 90 14P

PERSONAL AUTHORS: Baillieul, John

CONTRACT NO. AFOSR-89-0135

PROJECT NO. 3842

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0970, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report provides a detailed account of equipment purchases made under a DoD University Research Instrumentation Grant (AFOSR-89-0135). The equipment includes a Silicon Graphics IRIS 4D/120GTX workstation and a variety of hardware components which have been selected as components of real-time server network designed to support a graphical interface to experiments in the control of mechanical systems. A brief description is provided of the resulting hardware implementation and its use in controlling three different experimental systems-a flexible beam, a rotating kinematic chain, and a six axis industrial robot. A detailed breakdown of expenditures is provided. (rh)

DESCRIPTORS: (U) *CONTROL SYSTEMS, *DETECTORS, *ROBOTICS, CHAINS, CONTROL, GRAPHICS, INDUSTRIAL EQUIPMENT, INTERFACES, KINEMATICS, MECHANICAL COMPONENTS, PROCUREMENT, REAL TIME, ROBOTS, ROTATION.

IDENTIFIERS: (U) WUAFOSR3842A5, PE61104D.

AD-A226 783 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Some New Estimation Methods for Weighted Regression When There are Possible Outliers,

AUG 86 13P

PERSONAL AUTHORS: Giltinan, David M.; Carroll, Raymond J.; Ruppert, David

CONTRACT NO. F49620-82-C-0009, $NSF-MCS81-00748

MONITOR: AFOSR, XF
TR-90-0934, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Technometrics, v28 n3 p219-230 Aug 86.

ABSTRACT: (U) The problem considered is the robust estimation of the variance parameter in a heteroscedastic linear model. We treat the situation in which the variance is a function of the explanatory variables. To estimate robustly the variance in this case, it is necessary to guard against the influence of outliers in the design as well as outliers in the response. By analogy with the homoscedastic regression case, we propose two estimators that do this. Their performances are evaluated on a number of data sets. We had considerable success with estimators that bound the self-influence-that is, the influence an observation has on its own fitted value. We conjecture that in other situations (e.g., homoscedastic regression) bounding the self-influence will lead to estimators with good robustness properties. Keywords: Reprints. (Author) (kr)

DESCRIPTORS: (U) *ESTIMATES, *REGRESSION ANALYSIS, *WEIGHTING FUNCTIONS, DATA BASES, METHODOLOGY, PARAMETERS, REPRINTS, VARIATIONS.

IDENTIFIERS: (U) Outliers.

AD-A226 782 6/4 5/8

RUTGERS - THE STATE UNIV NEW BRUNSWICK NJ DEPT OF PSYCHOLOGY

(U) Eye Movements and Visual Information Processing.

DESCRIPTIVE NOTE: Interim progress rept. Apr 89-Apr 90,

AUG 90 4P

PERSONAL AUTHORS: Kowler, Eileen

CONTRACT NO. AFOSR-88-0171

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0978, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research extended our understanding of the visual and cognitive process controlling saccadic and smooth eye movements, and the role of these eye movements in visual information acquisition. Experiments showed that: (1) saccades are biased toward likely locations of targets, suggesting that previous reports of 'center-of-gravity' reflexes are actually due to search of attentional strategies; (2) saccades can be directed to spatially-extended targets with an accuracy and precision as good as those found for single point targets; (3) predictive smooth eye movements are caused by cognitive expectations about future path of target motion, not by learned oculomotor habits; (4) slow control is not sensitive to position error; (5) smooth eye movements are sensitive to the expected direction of future target motion; (6) strategies of scanning the boundaries of difficult texture patterns are more effective than strategies of scanning the symmetric axis; (7) normal reading is carried out by a coordinated pattern of eye movements and head movements.

DESCRIPTORS: (U) *EYE MOVEMENTS, *VISUAL TARGETS, VISUAL PERCEPTION, CONTROL, ATTENTION, COGNITION, MOVING TARGETS, SCANNING, READING, PSYCHOPHYSICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5.

AD-A226 782

AD-A226 768 20/5

PHYSICAL SCIENCES INC ANDOVER MA

(U) Rotational Energy Transfer in Metastable States of Heteronuclear Molecules.

DESCRIPTIVE NOTE: Interim rept., 27 Jun-26 Dec 88,

JAN 89 32P

PERSONAL AUTHORS: Davis, Steven J.

REPORT NO. PSI-1006/TR-855

CONTRACT NO. F49620-86-C-0061

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0913, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this program is to measure and interpret state-to-state R-T transfer rate coefficients for selected interhalogen molecules. Spectrally resolved CW laser-induced fluorescence is the experimental method being used. A CW dye laser excites pure quantum states. The resolved fluorescence of the laser-excited level and the collisionally populated J' levels are analyzed. We have determined nearly 1000 state-to-state rate coefficients for R-T transfer IF(B). Collision partners include He, Ne, Ar, Kr, Xe, N2, and CF4. Rate coefficients have also been determined for several initially excited J': 13, 27, 35 and 72. Keywords: Energy transfer, Rotational-translational transfer, Interhalogen molecules. (js)

DESCRIPTORS: (U) *METASTABLE STATE, *MOLECULES, COEFFICIENTS, CONTINUOUS WAVE LASERS, DYE LASERS, ENERGY TRANSFER, EXCITATION, FLUORESCENCE, HALOGEN COMPOUNDS, LASER BEAMS, PURITY, QUANTUM ELECTRONICS, RATES, ROTATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A226 768

AD-A226 740 20/5

EMORY UNIV ATLANTA GA DEPT OF CHEMISTRY

(U) Electronic Spectroscopy of the ArOH and ArOD Complexes.

JAN 90 10P

PERSONAL AUTHORS: Fawzy, Wafaa M.; Heaven, M. C.

CONTRACT NO. AFOSR-88-0249

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0976, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v92 n2 p909-916, 15 Jan 90.

ABSTRACT: (U) In general, neutral-free radicals can bind to a rare gas atom through electrostatic forces, charge transfer, and, when hydrogen is present, hydrogen bonding. The relative importance of these types of bonding may be deduced from spectroscopic analysis of the rotational structure of these complexes. Rare gas atom-diatomic radical complexes are the simplest polyatomic prototypes for initial investigations. The geometry of such a complex, determined from the rotational structure, provides valuable qualitative information concerning the dominant bonding mechanism. Finer details of the intramolecular interactions will be reflected in the spin-rotation and hyperfine coupling constants. When the radical possess electronic orbital angular momentum, additional insight can be gained from the effect of complex formation on the spin-orbit coupling. (js)

DESCRIPTORS: (U) *ANGULAR MOMENTUM, *BONDING, *SPECTROSCOPY, ATOMS, CHARGE TRANSFER, CONSTANTS, COUPLING(INTERACTION), ELECTRONICS, ELECTROSTATIC FIELDS, HYDROGEN, HYDROGEN BONDS, HYPERFINE STRUCTURE, ORBITS, POLYATOMIC MOLECULES, PROTOTYPES, RARE GASES, ROTATION, SPINNING(MOTION).

AD-A226 739 20/10 12/9 20/12

MISSOURI UNIV-ST LOUIS

(U) Quantum 1/f Noise in High Technology Applications Including Ultrasmall Structures and Devices.

DESCRIPTIVE NOTE: Annual rept. no. 1, 15 Jul 89-14 Jul 90,

JUL 90 43P

PERSONAL AUTHORS: Handel, Peter H.

CONTRACT NO. AFOSR-89-0416

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR, XF
TR-90-0938, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Quantum 1/f noise is basic property of physical cross sections and process rates and a form of quantum chaos in the nonlinear system of the charged particles plus the electromagnetic field. Therefore, the present report starts with a consideration of the general problem of 1/f spectra in nonlinear systems, derives for the first time a general sufficient criterion which tells us if a system will show 1/f noise, and applies the new criterion to transport in semiconductors, in metals, on highways, and in quantum electrodynamics. In all these cases 1/f spectra follow from the same criterion, in the same way. This is, for the first time, a unifying principle. In addition, the report contains the first rigorous first principles derivation of quantum 1/f mobility fluctuations in semiconducting materials (analytical) and reference to a Monte Carlo simulation of the same problem. Finally, a solution for the long-standing problem of quantum 1/f noise in the collector of BJT's is proposed. (rrh)

DESCRIPTORS: (U) *QUANTUM ELECTRODYNAMICS, *SEMICONDUCTORS, CROSS SECTIONS, ELECTROMAGNETIC FIELDS, HIGHWAYS, LONG RANGE(TIME), MATERIALS, METALS, MONTE CARLO METHOD, NONLINEAR SYSTEMS, PHYSICAL PROPERTIES, SIMULATION.

AD-A226 739 CONTINUED

IDENTIFIERS: (U) WUAFOSR2305C1, PE61102F, Quantum 1/F noise

AD-A226 702 12/6

STANFORD UNIV CA DEPT OF COMPUTER SCIENCE

(U) Computational Equipment for the Development of Numerical Algorithms Computation.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-31 Mar 88,

AUG 90 4P

PERSONAL AUTHORS: Golub, Gene H.

CONTRACT NO. AFOSR-87-0084

MONITOR: AFOSR, XF
TR-90-0998, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Under this grant, the following equipment was purchased: 7 SUN 3/50 workstations; 1 SUN 3/260 workstation; 1 SUN 3/180 file server; 1 CDC disk; 1 Eagle disk; 2 Apple Laser Writer printers. This equipment was of utmost importance in our research in the Scientific Computing and Computational Mathematics Program at Stanford. In particular, it allowed us to analyze, devise, and study various numerical algorithms associated with our research activity. I enclose a list of recent reports which depended heavily on the use of this equipment. Here are some special activities: The Lanczos method is a well known method for computing the eigen-values of symmetric matrices. For many years there has been an attempt to generalize this algorithm for matrices that are non-symmetric. There have been inherent difficulties, and for a long time it was not understood how to modify the algorithm for the non-symmetric case. In the last year, it has finally been understood how to formulate a stable and robust algorithm. We were able to develop numerical software for operating on non-symmetric matrices. (kr)

DESCRIPTORS: (U) *COMPUTATIONS, *DATA PROCESSING EQUIPMENT, *WORK STATIONS, ALGORITHMS, ASYMMETRY, COMPUTER PROGRAMS, LONG RANGE(TIME), MATHEMATICS, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES.

AD-A226 680 7/4

EMORY UNIV ATLANTA GA DEPT OF CHEMISTRY

(U) Rotationally Resolved Electronic Spectra for the Ne-OH and Ne-OD van der Waals Complexes.

90 4P

PERSONAL AUTHORS: Lin, Yaomin; Kulkarni, Sudhir K.; Heaven, Michael C.

CONTRACT NO. AFOSR-88-0249

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1001, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v94 n5 p1720-1722, 1990.

ABSTRACT: (U) Laser-induced fluorescence spectra have been recorded for systems of Ne-OH and Ne-OD. All of the transitions observed originated from the ground-state zero-point level. Ground-state rotational constants were found for the H and D isotopes, respectively. Bands corresponding to excitation of the van der Waals stretch and bend-stretch combinations were seen. The energy ranges encompassed by these bands provided lower limits for the van der Waals dissociation energies. Keyword: Inorganic chemistry. (JES)

DESCRIPTORS: (U) *INORGANIC CHEMISTRY, *LASER INDUCED FLUORESCENCE, *SPECTRA, CONSTANTS, ELECTRONICS, GROUND STATE, LIMITATIONS, LOW LEVEL, ROTATION, TRANSITIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A226 679 22/1

TEXAS A AND M RESEARCH FOUNDATION COLLEGE STATION

(U) Analytical and Experimental Research on Large Angle Maneuvers of Flexible Structures.

DESCRIPTIVE NOTE: Final rept. 1 Oct 88-31 Mar 90,

MAY 90 310P

PERSONAL AUTHORS: Junkins, John L.; Pollock, Thomas C.; Rahman, Zahidul H.

REPORT NO. TAMURF-AERO-90-5-1

CONTRACT NO. F49620-87-C-0078

PROJECT NO. 08912

TASK NO. K1

MONITOR: AFOSR, XF
TR-90-0919, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) New methods are presented for structural system identification and control of large angle maneuvers. Both analytical and experimental results are presented. Globally stable control laws for flexible body maneuvers are derived and validated experimentally. Stereo triangulation methods are proposed and tested experimentally for structural identification. Keywords: Flexible space structures, On orbit identification, Control design, Large angle maneuvers. (jhd)

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, *MANEUVERS, *SPACECRAFT, ANGLES, CONTROL, CONTROL THEORY, IDENTIFICATION, ORBITS, STABILITY, STRUCTURAL PROPERTIES, TRIANGULATION.

IDENTIFIERS: (U) PE62321C, WUAFOSR0812K1.

AD-A226 673 7/3

RHODE ISLAND UNIV KINGSTON

(U) Gordon Research Conference on Organometallic Chemistry Held in Andover, New Hampshire on August 13-17, 1984.

DESCRIPTIVE NOTE: Final rept. 1 Apr 84-31 Mar 85,

DEC 85 5P

PERSONAL AUTHORS: Faller, J. W.

CONTRACT NO. AFOSR-84-0102

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-1021, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The financial support of the Air Force Office of Scientific Research was greatly appreciated in the organization and presentation of this conference. The topics included: Bonding and Reactivity in Organometallics; Problems in Acetylene Metathesis; Bimetallic Clusters; Electron Transfer and Reactions of Organometallics; Stereochemistry and Mechanisms; Alkane Activation by Homogeneous Systems; Oxidation in Systems with Metal-Carbon Bonds. (JS)

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *CLUSTERING, ACETYLENE, ACTIVATION, ALKANES, BIMETALS, BONDING, CARBON COMPOUNDS, CHEMISTRY, ELECTRON TRANSFER, FINANCE, HOMOGENEITY, METAL COMPOUNDS, NEW HAMPSHIRE, ORGANOMETALLIC COMPOUNDS, OXIDATION, REACTIVITIES, STEREOCHEMISTRY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A226 672 7/4

WAYNE STATE UNIV DETROIT MI DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Flowing Afterglow Deposition for Indium Phosphide Interfacial Studies.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-30 Jul 85,

JAN 86 3P

PERSONAL AUTHORS: Arrathoon, R.

CONTRACT NO. AFOSR-85-0131

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1020, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Flowing Afterglow Chemical Vapor Deposition (FACVD) is a new materials growth process which has been under development at Wayne State University. The project is still in its early phases, but is promising because of its potential for producing novel kinds of materials suitable for microelectronic and optical applications. (JS)

DESCRIPTORS: (U) *INDIUM PHOSPHIDES, *INTERFACES, GROWTH(GENERAL), MICROELECTRONICS, OPTICAL PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 671 13/13

TEXAS A AND M UNIV COLLEGE STATION CENTER FOR MECHANICS OF COMPOSITES

(U) Experimental and Theoretical Determination of the Thermomechanical Response of Inelastic Structural Materials to High Energy Thermal Inputs.

DESCRIPTIVE NOTE: Final technical rept.,

JUL 90 297P

PERSONAL AUTHORS: Allen, D. H.; Pilant, M. S.

REPORT NO. CMC-5485-90-1

CONTRACT NO. F49620-86-K-0016

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0922, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The general objective of this research is to improve on existing theoretical models for predicting the response of inelastic aerospace structural components subjected to hostile thermal environments with emphasis on transient temperature conditions, radiation boundary conditions, extremely rapid heating rates, and possible phase change of the materials involved. For materials subjected to the conditions under study herein it is necessary to perform extremely complex experiments in order to determine the precise form of the theoretical constitutive equations. Finally, it is necessary to implement the resulting equations to boundary value problem solving algorithms in order to model the response of structural components with stress, strain, and temperature gradient fields. Keywords: Laser heating, Viscoplasticity, Finite element methods, Constitutive properties, Heat transfer, Thermomechanics. (JES)

DESCRIPTORS: (U) *STRUCTURAL COMPONENTS, ADVERSE CONDITIONS, AEROSPACE CRAFT, BOUNDARIES, CONSTRUCTION MATERIALS, ELASTIC PROPERTIES, EQUATIONS, FINITE ELEMENT ANALYSIS, HEAT, HEAT TRANSFER, HEATING, HIGH ENERGY, HIGH

AD-A226 671 CONTINUED

RATE, LASERS, MODELS, PHASE TRANSFORMATIONS, RADIATION, RESPONSE, TEMPERATURE, TEMPERATURE GRADIENTS, THEORY, THERMOMECHANICS, TRANSIENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1, Viscoplasticity.

AD-A226 669 9/5

ROCHESTER UNIV NY LAB FOR LASER ENERGETICS

(U) Ultrafast Optical Electronics Center.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 86-31 Mar , 90,

AUG 90 73P

PERSONAL AUTHORS: Mourou, Gerard

CONTRACT NO. F49620-87-C-0016

PROJECT NO. 3484

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0916, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The work done under the URI had the mission to bridge ultrafast optics with high-speed electronic and photonics. Ultrashort optical pulses have been used to study of fundamental processes taking place in the femtosecond and picosecond timescales in bulk and layered semiconductors, metals, and superconductors. Under this contract electron velocity overshoot in GaAs was time-resolved for the first time. Using short optical and electrical pulses, both sequential and resonant tunneling transport were investigated. The high-frequency properties of high-Tc superconductors in the 10-100 GHz range were studied. Time-resolved thermo-modulation was used to investigate the electron phonon interaction in metals. This URI also had an important technological impact. Novel techniques and devices were demonstrated. In particular, time-domain reflectometry, based on electrooptic sampling to test devices and circuits at room and cryogenic temperatures was developed. We test HEMT, PBT, heterostructure transistor prescaler, NMOS silicon multiplexer, and GaAs power amplifier MMIC. Broadband electronic requires a complete understanding of normal and superconducting transmission lines. Extensive work has been done in this area. A time-temperature of the first high-energy electron diffraction technique was also demonstrated and used to determine the surface temperature of the first monolayers in crystals. (Author)

AD-A226 669

AD-A226 669 CONTINUED

(kr)

DESCRIPTORS: (U) *ELECTROOPTICS, BRIDGES, BROADBAND, BULK SEMICONDUCTORS, CIRCUITS, CONTRACTS, CRYOGENICS, CRYSTALS, ELECTRIC CURRENT, ELECTRONICS, ELECTRONS, GALLIUM ARSENIDES, HIGH FREQUENCY, HIGH RATE, IMPACT, INTERACTIONS, LAYERS, LIGHT PULSES, LOW TEMPERATURE, METALS, MULTIPLEXING, OPTICAL PROPERTIES, OPTICS, PHONONS, POWER AMPLIFIERS, PULSES, REFLECTOMETERS, RESONANCE, SAMPLING, SEQUENCES, SHORT PULSES, SILICON, SPACE(ROOM), SUPERCONDUCTORS, SURFACE TEMPERATURE, TEST EQUIPMENT, TIME DOMAIN, TRANSMISSION LINES, TRANSPORT, TUNNELING, VELOCITY.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A3, *Photonics, *Ultrafast optics.

AD-A226 669

AD-A226 668 5/8

NEW YORK UNIV NY NEUROMAGNETISM LAB

(U) Cognitive and Neural Bases of Skilled Performance.

DESCRIPTIVE NOTE: Final rept. 5 Sep 86-30 Nov 89,

AUG 90 48P

PERSONAL AUTHORS: Kaufman, Lloyd; Williamson, Samuel J.

CONTRACT NO. F49620-86-C-0131

PROJECT NO. 3484

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-0918, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Major improvements were introduced for neuromagnetic studies by the installation of a magnetically shielded room and versatile gantry to hold our 5-sensor neuromagnetometer. Studies with this system verify that the strength of the 100-ms component of the cortical response to a tone is unaffected by tone frequency and intensity at suprathreshold levels, but we have shown that both the 100-ms and 180-ms components are affected by attention. Moreover, we have obtained evidence that auditory cortex in left and right hemispheres may have differing responses to a tone depending on the inter-stimulus interval. Neuronal sources of certain components of auditory-evoked responses are found to be displaced across cortex from the others, with a tonotopic representation for the 50-ms transient component apparently differing from the representation for the steady-state component, which has a similar apparent latency. Studies of spatial attention have revealed robust effects for latencies exceeding 200 ms, unlike for the auditory system, but some subjects show effects commencing as early as 100 ms. An investigation of the classic P300 response for both visual and auditory stimulation has been initiated with a more efficient paradigm, and early results provide evidence that the neuronal source is independent of sensory modality. To address the question of how much cortex is involved in producing an evoked field or

potential, we have analyzed published data on intracortical voltage measurements in cat and monkey and found that the current dipole moment per square millimeter of cortical area is very much the same at moments of peak activity for long-latency responses. (SDW)

DESCRIPTORS: (U) *COGNITION, *PERFORMANCE(HUMAN), *MAGNETOENCEPHALOGRAMS, ATTENTION, CEREBRAL CORTEX, DIPOLE MOMENTS, HEARING, HEMISPHERES, MILLIMETER WAVES, MOMENTS, NERVE CELLS, PEAK VALUES, RESPONSE(BIOLOGY), SPATIAL DISTRIBUTION, STEADY STATE, STIMULATION(PHYSIOLOGY), VISION, SKILLS.

IDENTIFIERS: (U) Event related potentials.

AD-A226 665 9/1

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Model-Free Distributed Learning.

DESCRIPTIVE NOTE: Rept. for 1989-1990,

MAR 90 15P

PERSONAL AUTHORS: Dembo, Amir; Kailath, Thomas

CONTRACT NO. AFOSR-88-0327

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-90-1000

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Neural Networks, v1 n1 p58-70 Mar 90.

ABSTRACT: (U) Model-free learning for synchronous and asynchronous quasi-static networks is presented. The network weights are continuously perturbed while the time varying performance index is measured and correlated with the perturbation signals; the correlation output determines the changes in the weights. The perturbation may be either via noise sources or orthogonal signals. The invariance to detailed network structure mitigates large variability between supposedly identical networks as well as implementation defects. This local, regular, and completely distributed mechanism requires no central control, and involves only few global signals. Thus it allows for integrated, on-chip learning in large analog and optical networks. Keywords: Reprints, Artificial neural networks, Nonlinear devices, Model-based learning, Back propagation algorithm, Random perturbations, Closed-loop analysis. (Author) (KR)

DESCRIPTORS: (U) *ASYNCHRONOUS SYSTEMS, *LEARNING, *NEURAL NETS, ALGORITHMS, ANALOG SYSTEMS, CENTRALIZED, CHIPS(ELECTRONICS), CLOSED LOOP SYSTEMS, CORRELATION, DISTRIBUTION, GLOBAL, INDEXES(RATIOS), INVARIANCE, MODELS, NETWORKS, NOISE, NONLINEAR SYSTEMS, OPTICAL PROPERTIES, ORTHOGONALITY, OUTPUT, PERTURBATIONS, PROPAGATION,

AD-A226 665 CONTINUED

REPRINTS, SIGNALS, SOURCES, STATICS, TIME, VARIATIONS, WEIGHT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6, *Synchronous networks.

AD-A226 647 12/7

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) Numerical Evaluation of Performability and Job Completion Time in Repairable Fault-Tolerant Systems,

90 7P

PERSONAL AUTHORS: Kulkarni, V. G.; Nicola, V. F.; Smith, R. M.; Trivedi, K. S.

CONTRACT NO. AFOSR-84-0123, $AFOSR-84-0140

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR, XF
TR-90-1009, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Fault-tolerant computer systems change their level of performance (e.g., mode of operation or service rate) in response to different events such as failure, degradation or repair. We present a unified model for the analysis of job (task) completion time and the accumulated service (Reward) until a given time (also known as performability). In prior work, the evaluation of the distribution of performability was restricted to nonrepairable systems (represented by acyclic Markov chains). In this paper, we describe an algorithm for the numerical evaluation of the distributions of performability or job completion time, in repairable fault-tolerant systems (represented by cyclic Markov chains). We demonstrate the feasibility of our techniques by means of numerical examples. (Author) (KR)

DESCRIPTORS: (U) *FAULT TOLERANT COMPUTING, *SYSTEMS ENGINEERING, *NUMERICAL ANALYSIS, ACCUMULATION, ALGORITHMS, CYCLES, DEGRADATION, MARKOV PROCESSES, OPERATION, RATES, REPAIR.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304K3.

AD-A226 646 7/6

NORTHWESTERN UNIV EVANSTON IL

(U) PBT, PBO-Based Hybrid Polymers with Nonlinear Optical Properties or High Electrical Conductivity.

DESCRIPTIVE NOTE: Final rept. 1 Jul 88-30 Nov 89,

AUG 90 25P

PERSONAL AUTHORS: Marks, Tobin J.; Carr, Stephen H.

CONTRACT NO. F49620-88-C-0122

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1025, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program has involved a combined synthetic, processing, and physicochemical study of multifunctional, high-performance polymer systems rationally designed for certain unusual physical properties. In one thrust, the unique properties of the high modules/high strength macromolecules poly(p-phenylenebenzabisthiazole) (PBT) an poly (p-phenylenebisoxazolo) (PBO) have been utilized to develop new kinds of electrically conductive polymeric and molecular/macromolecular hybrid materials. In the second thrust, several complementary approaches to the construction, evaluation, and fundamental understanding of new types of high-performance nonlinear optical materials have been pursued. Areas of emphasis have included chromophore-functionalized glassy polymers, chromophore-embedded crosslinkable matrices, inorganic/organic hybrid materials, crosslinked NLO films, the design of novel chromophores, and internally ordered polymeric NLO materials. Each research component has built upon past successes as well as upon strong on-going collaborations in laser optics and quantum theory. Keywords: Polymer, Nonlinear optics, Chromophore, Second harmonic generation. (JS)

DESCRIPTORS: (U) *POLYMERS, CHROMOPHORES, ELECTRICAL CONDUCTIVITY, HARMONIC GENERATORS, HIGH RATE, HYBRID

AD-A226 646 CONTINUED

SYSTEMS, INORGANIC MATERIALS, LASERS, NONLINEAR OPTICS, NONLINEAR SYSTEMS, OPTICAL MATERIALS, OPTICAL PROPERTIES, OPTICS, ORGANIC MATERIALS, PERFORMANCE(ENGINEERING), PHYSICAL PROPERTIES, PHYSICOCHEMICAL PROPERTIES, QUANTUM THEORY, THRUST.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A226 630 9/3

SCHWARTZ ELECTRO-OPTICS INC CONCORD MA RESEARCH DIV

(U) Chromium Sensitized Garnets for Mid-IR Lasers.

DESCRIPTIVE NOTE: Final rept. 30 Jan 88-29 Jan 90,

JAN 90 26P

PERSONAL AUTHORS: Moulton, Peter F.

CONTRACT NO. F49620-88-C-0046

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-0861, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The characteristics of chromium-sensitized solid state lasers operating in the mid-infrared wavelength region have been studied. During the second year of research there was continued work on crystals doped with holmium and erbium, operating in the 2100-nm and 2800-nm regions. In addition, preliminary measurements were made on the laser performance of thulium around 2010 nm. For all these materials the effect of pump pulse length on output energy and overall efficiency has been measured. A flashlamp-pumped Cr,Nd: GSGG slab laser was operated and characterized at 1061 and 1310 nm. Measurements included comparison of normal mode slope efficiencies, input-output vs. pump pulse length, characterization of thermal lensing and measurement of Q-switched performance at 1061 nm. Spectroscopic properties of GGG crystals doped with Ce4+ ions were measured, including absorption and emission spectra and fluorescence lifetime. Keywords: Chromium sensitized solid state lasers, Mid infrared wavelength region. (js)

DESCRIPTORS: (U) *LASERS, ABSORPTION, CHROMIUM, CRYSTALS, EFFICIENCY, EMISSION SPECTRA, ENERGY, ERBIUM, FLUORESCENCE, FREQUENCY, GARNET, HOLMIUM, INTERMEDIATE INFRARED RADIATION, LENGTH, LIFE SPAN(BIOLOGY), OUTPUT, PERFORMANCE(ENGINEERING), PULSES, PUMPS, Q SWITCHING, REGIONS, SENSITIZING, SLOPE, SPECTROSCOPY, THERMAL LENS

AD-A226 630

AD-A226 630 CONTINUED

EFFECT, THULIUM.

IDENTIFIERS: (U) PE61102F, WUAFOSR3005A1.

AD-A226 599 20/2

OKLAHOMA STATE UNIV STILLWATER

(U) Energy Transfer and Reaction Dynamics of Matrix-Isolated 1,2-Difluoroethane-d4,

SEP 90 18P

PERSONAL AUTHORS: Raff, Lionel M.

CONTRACT NO. AFOSR-89-0085

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-1029, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v93 n5 p3160-3176 1 Sep 90.

ABSTRACT: (U) The molecular dynamics of vibrationally excited 1,2-difluoroethane-d4 isolated in Ar, Kr, and Xe matrices at 12 K are investigated using trajectory methods. The matrix model is an fcc crystal containing 125 units cells with 666 atoms in a cubic (5x5x5) arrangement. It is assumed that 1,2-difluoroethane-d4 is held interstitially within the volume bounded by the innermost unit cell of the crystal. The transport effects of the bulk are simulated using the velocity reset method introduced by Riley, Coltrin, and Diestler (J. Chem. Phys, 88,5934(1988)). The system potential is written as the separable sum of a lattice potential, a lattice-molecule interaction and gas-phase potential for 1,2-difluoroethane. The first two of these are assumed to have pairwise form while the molecular potential is a modified form of the global potential previously developed for 1,2-difluoroethane (J. Phys. Chem. 91, 3266(1987). (jes)

DESCRIPTORS: (U) *CRYSTALS, CELLS, DYNAMICS, ENERGY TRANSFER, GLOBAL, MOLECULAR PROPERTIES, RESPONSE, TRAJECTORIES, TRANSPORT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A226 479 11/2 11/4

DREXEL UNIV PHILADELPHIA PA DEPT OF MATERIALS ENGINEERING

(U) Structure and Properties of High Symmetry Composites.

DESCRIPTIVE NOTE: Final rept. 1 Dec 87-30 Nov 90,

JUL 90 270P

PERSONAL AUTHORS: Ko, Frank K.; Wang, Albert S.; Lei, Charles; Carroll, Eileen A.; Cai, Yun J.

CONTRACT NO. AFOSR-88-0075

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0873, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the concept formulation and demonstration for high symmetry composites by examination of the combination of spheres in 3-D fiber architectures. By computer simulation, the level of geometric symmetry composites, a finite cell model and a finite element code for the analysis of sphere have been developed. A method for the fabrication of the high symmetry system has also been developed. Keywords: High symmetry composite, 3-D Fiber architecture, Spherical reinforcement, Finite cell modeling. (js)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, CELLS, CODING, COMPUTERIZED SIMULATION, FINITE ELEMENT ANALYSIS, GEOMETRY, MODELS, SPHERES, SYMMETRY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

AD-A226 479

AD-A226 437 12/4 13/2

MASSACHUSETTS UNIV AMHERST DEPT OF CIVIL ENGINEERING

(U) Representation of Strategic Choices in Structural Modeling.

DESCRIPTIVE NOTE: Final rept. Oct 88-Aug 89,

JUN 90 58P

PERSONAL AUTHORS: Salata, Steven E.; Dym, Clive L.

CONTRACT NO. AFOSR-88-0006

PROJECT NO. 2302 .

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0882, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Structural modeling requires the construction of an appropriate mathematical description to describe the behavior of a physical object. Because conflicting goals and uncertainty permeate the process of structural modeling, structural model derivation is a complicated process. Therefore, to effectively and efficiently model any structure, one must have a method for planning actions, for proceeding in the face of uncertain information, and for dealing with uncertainty. This paper presents a method for representing structural modeling as a strategic process involving decision-making in an environment where the results of any decision may not be known with complete certainty. Specifically, an existing task-level architecture developed to manage uncertainty in treating cardiac disease is adapted to embody the strategic knowledge of a structural engineer in formulating and solving structural problems. The MUMS system focuses on plates as the structure of interest in its pilot implementation. Since the system is concerned with structural modeling at the strategic level (as opposed to a detailed design, for instance), the ideas presented are applicable to modeling any structure. Keywords: Knowledge based systems. (Author)

DESCRIPTORS: (U) *KNOWLEDGE BASED SYSTEMS, *MATHEMATICAL MODELS, *STRUCTURAL ENGINEERING, CARDIOVASCULAR DISEASES,

AD-A226 437

AD-A226 437 CONTINUED

ENGINEERS, PHYSICAL PROPERTIES, PLANNING, PROBLEM SOLVING, UNCERTAINTY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

AD-A226 351 20/4

ARIZONA STATE UNIV TEMPE DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Navier-Stokes Simulation of Boundary-Layer Transition.

DESCRIPTIVE NOTE: Final rept. 14 Apr 87-14 Oct 89,

MAY 90 40P

PERSONAL AUTHORS: Reed, Helen L.

CONTRACT NO. AFOSR-87-0237

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0886, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This Report describes the successful efforts to computationally model the receptivity of the laminar boundary layer on a semi-infinite flat plat with an elliptic leading edge by a spatial simulation. The compressible flow is simulated by solving the governing full Navier-Stokes equations in general curvilinear coordinates by a finite difference method. First, the steady basic-state solution is obtained in a transient approach using spatially varying time steps. Then, a small-amplitude acoustic disturbances of the freestream velocity are applied as unsteady boundary conditions, and the governing equations are solved time-accurately to evaluate the spatial and temporal developments of the perturbation leading to instability waves (Tollmien-Schlichting waves) in the boundary layer. The effect of leading type radius on receptivity is determined. (jhd)

DESCRIPTORS: (U) *BOUNDARY LAYER TRANSITION, *LAMINAR BOUNDARY LAYER, *NAVIER STOKES EQUATIONS, COMPRESSIBLE FLOW, COORDINATES, CURVES(GEOMETRY), ELLIPSES, FINITE DIFFERENCE THEORY, FREE STREAM, LEADING EDGES, LINEAR SYSTEMS, SIMULATION, SPATIAL DISTRIBUTION, STABILITY, TRANSIENTS, WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2, Tollmien Schlichting Waves.

AD-A226 335 6/4

ROCHESTER UNIV NY CENTER FOR VISUAL SCIENCE

(U) Peripheral Limitations on Spatial Vision.

DESCRIPTIVE NOTE: Interim rept. 1 Aug 89-31 Jul 90,

JUL 90 10P

PERSONAL AUTHORS: Williams, David R.

CONTRACT NO. AFOSR-88-0292

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0877, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project employs psychophysical techniques to examine the limitations on spatial vision imposed by the first stages in the visual pathway. Many of the experiments capitalize on laser interferometry, which allows sinusoidal gratings to be formed on an observer's retina that are immune to optical blurring. The appearance of very high frequency gratings to distorted, or aliased, by the cone mosaic. Such moire patterns provide the basis for psychophysical techniques to assess the topography of the cone mosaic in the living eye. These measurements, accompanied by measurements of visual acuity clarify the relationship between cone spacing and resolution. Resolution was also measured under conditions in which only the M or L cones could detect the interference fringe. Visual acuity was little different than it was when both cone types detected the grating, showing that resolution is immune to photoreceptor loss under these circumstances. We also established an aliasing phenomenon caused by spatial sampling by M and L cones. Interferometry also allows measurements of the optical quality of the eye, and a viable experimental design has been established to estimate the off-axis optical quality of the eye.

DESCRIPTORS: (U) *RETINA, *OPTOMETRY, *VISION, PSYCHOPHYSICS, COLOR VISION, GRIDS, VERY HIGH FREQUENCY, CONTRAST, NONLINEAR SYSTEMS, MOSAICS(LIGHT SENSITIVE),

AD-A226 335 CONTINUED

TOPOGRAPHY, INTERFEROMETRY, LASER APPLICATIONS, MOIRE EFFECTS, SAMPLING, SPATIAL DISTRIBUTION, RESOLUTION, DISTORTION, VISUAL ACUITY.

IDENTIFIERS: (U) Aliasing, Spatial vision, *Cones(Retina), Cone mosaic, Frequency doubling, PE61102F, WUAFOSR2313A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 332 17/9 4/1 20/14 14/2

UTAH STATE UNIV LOGAN CENTER FOR ATMOSPHERIC AND SPACE SCIENCES

(U) DURIP Application of Multiprocessing to Real-Time Analysis and Control of an Ionospheric Research Radar.

DESCRIPTIVE NOTE: Final technical rept. 1 Dec 88-30 Apr 90,

JUN 90 17P

PERSONAL AUTHORS: Berkey, Frank T.

REPORT NO. CASS-90-7-01

CONTRACT NO. AFOSR-89-0094

PROJECT NO. 3842

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0878, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The utilization of high-frequency (HF) radio waves to probe the ionosphere was begun more than 50 years ago when the first swept frequency vertical incidence ionospheric sounder (ionosonde) was developed (see Villard. 1976). A technology evolved, so did the design of ionospheric sounders and several generations of sounders have been developed. As a result, the ionosonde has continued to remain a viable tool for the ionospheric physicist and vast amounts of ionospheric data have been collected. Over the past two decades, with the incorporation of digital technology into ionosondes, more sophisticated ionospheric sounders have been developed, with the capability of measuring the amplitude, phase, angle-of-arrival, polarization and Doppler shift in addition to the time-of-flight (ie. range) of the returned echo (Wright and Fedor, 1969; Reinisch, 1986). These systems have also employed digital recording techniques, markedly simplifying hte analysis interpretation of ionograms. Here, details of the NOAA digital ionospheric sounding radar and the Lowell University Digisonde will be discussed briefly as the design concepts are representative of state-of-the-art

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ionospheric sounders. (rh)

DESCRIPTORS: (U) *DIGITAL RECORDING SYSTEMS, *DOPPLER EFFECT, *IONOGRAMS, *IONOSPHERE, *PROBES, *RADIO WAVES, ADDITION, DIGITAL SYSTEMS, FLIGHT, HIGH FREQUENCY, IONOSONDES, MULTIPROCESSORS, PHYSICISTS, POLARIZATION, RADAR, REAL TIME, STATE OF THE ART, TIME, UTILIZATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR3842A2.

AD-A226 332

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 331 5/8

CALIFORNIA UNIV SAN DIEGO LA JOLLA

(U) Comparative Analytical Study of Evoked and Event Related Potentials as Correlates of Cognitive Processes.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 89-31 Jul 90.

JUL 90 7P

PERSONAL AUTHORS: Bullock, Theodore H.; Basar, Erol

CONTRACT NO. AFOSR-89-0456

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-0876, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project is a collaboration between the two named laboratories, extending the capabilities of each group. It combines the analytical approach of multielectrode recording from many places in the brain with comparative approach of seeking clues from lower animal species. Using selected paradigms of stimulus presentation or omission already known to trigger Event Related Potentials (ERPs) in humans, as well as mental events, this program compares brain recording from cats, reptiles, fish and other lower models, analyzing both single trials and averages from many channels. Sacrificing the advantage of human subjects easy to instruct and to control with respect to attention, we can go farther in number of intracranial electrodes in deep cerebral and brainstem loci. Early results show that lower species have ERPs by the definition of the stimulus regime and that much of this response occurs at lower brain levels, probably precognitive, suggesting the need to distinguish the components in humans that depend on cognition from those that do not. New forms of grading the expectation of stimuli are being compared on humans, cats, and lower species. Keywords: Electroencephalogram, Event related potentials, Evoked potentials. (sdw)

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DESCRIPTORS: (U) *COGNITION, *ELECTROENCEPHALOGRAPHY, ANIMALS, BRAIN, CATS, ELECTRODES, HUMANS, INTERNAL, LOW LEVEL, MENTAL ABILITY, MODELS, RECORDING SYSTEMS, REPTILES, SKULL, STIMULI.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4, ERP(Event Related Potentials).

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 330 20/9

MARYLAND UNIV COLLEGE PARK LAB FOR PLASMA RESEARCH

(U) Formation and Stability of Partially-Neutralized Plasma Clumps.

DESCRIPTIVE NOTE: Final rept. 15 Dec 85-14 Jan 90,

AUG 89 52P

PERSONAL AUTHORS: Guillory, John; Yao, Ren L.; Striffler, Charles D.; Reiser, Martin

CONTRACT NO. AFOSR-86-0055

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-90-0912

UNCLASSIFIED REPORT

ABSTRACT: (U) In experiments in which an intense relativistic electron beam is injected into an evacuated drift tube with a localized gas cloud located near the anode, ions with energies several times the electron beam energy have been observed. These experiments have been simulated using a particle-in-cell code which realistically models ionization of the gas. It was found that when the injected electron beam current exceeds the space-charge limiting current, ions are accelerated to energies several times the electron beam energy by coherent motion of the ions and the intense virtual cathode electric fields. The dependence of the peak ion energy on the system parameters as observed in the simulations is alo discussed. For the parameter regimes investigated with beam energies up to 3 MV, beam currents up to 35 kA, gas pressures up to 600 mTorr, and gas cloud widths up to 6 cm, peak ion energies of 5-6 times the electron beam energy have been observed. Keywords: Neutralized plasma clumps, Ionization, Photoionization. (JHD)

DESCRIPTORS: (U) *PLASMAS(PHYSICS), *PHOTOIONIZATION, *SPACE CHARGE, PLASMA DEVICES, COHERENCE, CURRENTS, ELECTRIC CURRENT, ELECTRODES, ELECTRON BEAMS, ELECTRON ENERGY, ELECTRONS, ENERGY, IONIZED GASES, INTENSITY, IONS,

AD-A226 330 CONTINUED

LIMITATIONS, MODELS, MOTION, PARAMETERS, PARTICLE ACCELERATOR COMPONENTS, PEAK VALUES, PRESSURE, RELATIVITY THEORY.

IDENTIFIERS: (U) Plasma clumps, Drift tubes, PE61102F, WUAFOSR2301A7.

AD-A226 287 20/5

COLORADO UNIV AT BOULDER

(U) Ab Initio Calculation of the X ^Sigma+ A 2Pi States of CF++,

JUL 90 9P

PERSONAL AUTHORS: Senekowitsch, Joerg; O'Neil, Stephen V.; Werner, Hans-Hoachim; Knowles, Peter J.

CONTRACT NO. AFOSR-89-0074

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-90-0883

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v93 p562-569, 1 Jul 90.

ABSTRACT: (U) The potential energy, dipole moment, and electronic transition moment curves of the X 2 sigma(+) and A 2 Pi states of the doubly charged CF(++) ion have been calculated from internally contracted multireference CI wave functions with full valence complete active space self-consistent field reference wave functions and large Gaussian basis sets. Both states are predicted to be metastable with equilibrium geometries R sub e (X 2 sigma(+)) = 2.139 Bohr and R sub e (A 2 Pi = 3.073 Bohr. These minima lie above and are separated from their asymptotes by broad barriers with a height of 4.99 eV (X 2 sigma(+)) and 1.04 eV (A 2 Pi), respectively. Similar to the isoelectronic NO(++), the Pi state intersects the barrier of the X 2 sigma(+) state. Radiative and nonradiative (tunneling) lifetimes of all vibrational levels have been calculated by standard quantum mechanical scattering techniques. Reprints. (jhd)

DESCRIPTORS: (U) *WAVE FUNCTIONS, *MOLECULAR STATES, DIPOLE MOMENTS, EQUILIBRIUM(GENERAL), POTENTIAL ENERGY, REPRINTS, VALENCE, MOLECULAR VIBRATION, FLUORIDES, CARBON COMPOUNDS, CHEMICAL RADICALS, TUNNELING(ELECTRONICS), QUANTUM THEORY.

AD-A226 287 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, Carbon Fluorides, Ab Initio calculations, Self consistent fields.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 257 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Trimmed Sums of Mixing Triangular Arrays with Stationary Rows.

DESCRIPTIVE NOTE: Technical rept.,

MAR 90 23P

PERSONAL AUTHORS: Maejima, Makoto; Morita, Yuko

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0856, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Limit laws of trimmed sums are studied for triangular arrays of rowwise stationary random variables. It is shown that if the marginal distribution of the array belongs to the domain of attraction of an infinitely divisible law without Gaussian component, the trimmed sum converges weakly to a nondegenerate random variable under some mixing and local dependence conditions. Keywords: Stationary. (Author) (KR)

DESCRIPTORS: (U) *STATIONARY, *RANDOM VARIABLES, ARRAYS, DISTRIBUTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, *Triangular arrays.

AD-A226 252 7/4

WISCONSIN UNIV-MADISON CENTER FOR MATHEMATICAL SCIENCES

(U) Remarks on the Traveling Wave Theory of Dynamic Phase Transitions,

89 14P

PERSONAL AUTHORS: Slemrod, M.

CONTRACT NO. AFOSR-87-0315

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR, XF
TR-90-0868, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IUTAM Symposium, p325-337 1989.

ABSTRACT: (U) This reprint reviews the traveling wave theory of phase transitions especially as this theory relates to the dynamics of van der Waals like fluids. The paper is divided into three sections after this one. The first section derives the balance laws of mass, momentum, and energy for the one dimensional motion of a viscous, heat conducting fluid possessing a Korteweg-van der Waals contribution to the stress. Also derived are the ordinary differential equations governing the motion of traveling waves. The second section describes some solutions of the traveling wave boundary value problem and their relevance to the phenomena of shock splitting. The third section discusses possible relevance of the traveling wave theory to experiment. (jhd)

DESCRIPTORS: (U) *PHASE TRANSFORMATIONS, *TRAVELING WAVES, DIFFERENTIAL EQUATIONS, DYNAMICS, FLUIDS, MOMENTUM, MOTION, ONE DIMENSIONAL, REPRINTS, SHOCK, SPLITTING, THEORY, BOUNDARY VALUE PROBLEMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9, Van der Waals Equations.

AD-A226 250 20/3

STD RESEARCH CORP ARCADIA CA

(U) Magnetofluidmechanics.

DESCRIPTIVE NOTE: Final rept. 1 Jun 84-30 Sep 86,

87 49P

PERSONAL AUTHORS: Demetriades, S. T.; Oliver, D. A.; Maxwell, C. D.

CONTRACT NO. F49620-84-C-0068

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-0860, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The magnetic field equations of a conducting fluid slab under steady flow were found subject to the boundary condition that the induced magnetic field immediately in front of the fluid exactly oppose the corresponding induced magnetic field at the trailing edge of the fluid so as to maintain divergence of B equal to 0. Experimentally, MHO generators with rocket type combustors were shown to be a viable form of portable, high peak power sources. Keywords: Magnetofluidmechanics, Thermodynamics, Electromagnetic. (jhd)

DESCRIPTORS: (U) *FLUID MECHANICS, *MAGNETIC FIELDS, BOUNDARIES, COMBUSTORS, ROCKETS, STEADY FLOW, THERMODYNAMICS, TRAILING EDGES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7, Magnetofluidmechanics.

AD-A226 250

AD-A226 236 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On Path Properties of Certain Infinitely Divisible Processes,

89 16P

PERSONAL AUTHORS: Rosinski, Jan

REPORT NO. TR-207

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0850, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Stochastic Processes and their Applications, v33 p73-87 1989.

ABSTRACT: (U) Let (X(t):t an element of T) be a stochastic process equal in distribution to (integral over s of f(t,s) lambda (ds): t element of T), where lambda is a symmetric independently scattered random measure and f is a suitable deterministic function. It is shown that various properties of the sections f(.,s)s an element of S, are inherited by the sample paths of X, provided X has no Gaussian component. The analogous statement for Gaussian processes is false. As a main tool, LePage-type series representation is fully developed for symmetric stochastic integral processes and this may be of independent interest. Keywords: Infinitely divisible processes, Sample path properties, Series and stochastic integral representations. Reprints. (JHD)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *SERIES(MATHEMATICS), DETERMINANTS(MATHEMATICS), FUNCTIONS, MEASUREMENT, PATHS, REPRINTS, SCATTERING, SYMMETRY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 198 9/1 20/12 20/6 12/9 20/10

CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

(U) Joint Services Electronics Program.

DESCRIPTIVE NOTE: Final rept. 1 May 87-31 May 90,

JUL 90 17P

PERSONAL AUTHORS: Oldham, W. G.; Hu, C.

REPORT NO. UCB/ERL-90/7

CONTRACT NO. F49620-87-C-0041

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR, XF
TR-90-0843, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Joint Services Electronics Program (JSEP) is an important part of the electronics research at the University of California, Berkeley, JSEP is particularly important to the development of new research directions and new faculty investigators. It also provides much needed support for the more basic electronics research. Furthermore, JSEP has encouraged collaborative research involving multiple principal investigators per project. Over the period May 1987 to May 1990 JSEP has supported 20 faculty investigators, 57 students and produced 65 publications in journals or conference proceedings, 14 Ph.D. degrees and 22 M.S. degrees. The research program is organized into two themes: high-speed wide-band elements for high frequency electronics, and new architecture parallel computation. Under the program, several important new phenomena were discovered for highly scaled MOSFETs and the word's fastest room temperature silicon transistor (22ps, fastest for either bipolar or MOS transistors) was fabricated. Nonlinear guided-wave devices such as optical correlator and spectrometer were created. Techniques for achieving tolerance and efficient programming in artificial neural networks were found. The most productive work units of the present program will be

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expanded and continued in the next three-year JSEP contract. The new program is organized around three themes: quantum electronics, electronic devices, and neural networks. (r.h.)

DESCRIPTORS: (U) *BIPOLAR TRANSISTORS, *ELECTRONIC EQUIPMENT, *ELECTRONICS, *FIELD EFFECT TRANSISTORS, *METAL OXIDE SEMICONDUCTORS, *MOSFET SEMICONDUCTORS, *NEURAL NETS, *NONLINEAR SYSTEMS, *OPTICAL CORRELATORS, *QUANTUM ELECTRONICS, ARCHITECTURE, BROADBAND, CALIFORNIA, COMPUTATIONS, COMPUTER PROGRAMMING, EFFICIENCY, HIGH FREQUENCY, INSTRUCTORS, PARALLEL PROCESSING, ROOM TEMPERATURE, SILICON, SPECTROMETERS, TRANSISTORS, WAVEGUIDES.

AD-A226 177 7/3

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Advanced Organic Solid States Materials. Volume 173. Materials Research Society Symposium Proceedings.

AUG 90 734P

PERSONAL AUTHORS: Chiang, Long Y.; Chaikin, Paul M.; Cowan, Dwaine O.

CONTRACT NO. AFOSR-90-00895

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0884, AFOSR

UNCLASSIFIED REPORT

Availability: Materials Research Society, 9800 McKnight Road, Suite 327, Pittsburgh, PA 15237. No copies furnished by DTIC/NTIS.

ABSTRACT: (U) This volume contains the proceedings of the Symposium of The Electrical, Optical and Magnetic Properties of Organic Solid State Materials held at the Fall Meeting of the Materials Research Society, November 27 - December 2, 1989. This was the first MRS symposium to address the new and rapidly emerging areas of organic solids designed for a broad spectrum of electrical, magnetic and optical properties. Most organic compounds in the past have been prepared for either their structural properties. This could be the dawn of a new era in organic materials. (js)

DESCRIPTORS: (U) *ORGANIC COMPOUNDS, MAGNETIC PROPERTIES, MATERIALS, OPTICAL PROPERTIES, ORGANIC MATERIALS, SOCIETIES, SOLIDS, STRUCTURAL PROPERTIES, SYMPOSIA, TWILIGHT.

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F.

AD-A226 144 9/1

CALIFORNIA UNIV BERKELEY

(U) Studies of Hetero-Epitaxy of GaAs Films on Si Substrate for Effective Control of Defect Density and Internal Stress.

DESCRIPTIVE NOTE: Annual rept. 15 Apr 89-14 Apr 90,

MAY 90 14P

PERSONAL AUTHORS: Wang, Shyh

CONTRACT NO. AFOSR-88-0174

MONITOR: AFOSR, XF
TR-90-0871, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period April 89-90, we carried out experiments on studies of heteroepitaxial films grown on lattice-mismatched substrates in three main areas: (1) migration-enhanced (or modulated) MBE to promote 2-dimensional growth of heteroepitaxial films, (2) growth on patterned substrates to reduce thermal stress, and (3) study of GaAs/Si laser characteristics, especially polarization dependence and threshold current, to correlate with results from basic material studies in area 1 and 2. Recently we have started exploring new directions for hetero-epitaxy on lattice-mismatched substrates, and have done exploratory work on (4) growth on (111) plane of strained AlInAs/AlAs quantum well and (5) GaAs growth on Si/sapphire (SOI) substrate. In this report, we first summarize experimental results on work in groups 1, 2 and 3. This followed by a discussion of our exploratory work which will point the direction for our future research.

DESCRIPTORS: (U) *FILMS, CONTROL, DENSITY, EPITAXIAL GROWTH, GALLIUM ARSENIDES, GROWTH(GENERAL), INTERNAL, LASERS, MATERIALS, ORIENTATION(DIRECTION), POLARIZATION, SAPPHIRE, STRESSES, SUBSTRATES, THERMAL STRESSES, THRESHOLD EFFECTS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A226 143 20/12 9/5 20/7 12/5

ARIZONA STATE UNIV TEMPE

(U) In situ GSMBE Growth Monitoring for Optoelectronic Devices.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-31 May 90,

JUL 90 8P

PERSONAL AUTHORS: Maracas, George N.

CONTRACT NO. AFOSR-89-0180

PROJECT NO. 3842

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0870, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Presented is the establishment of a semiconductor optical properties characterization facility constructed at Arizona State University under the sponsorship of an AFOSR-URIP. The fully computerized system is connected to our MBE and electrical properties characterization laboratory network and will be used for two purposes: (1) to study the properties of photonic materials and devices and (2) to study the growth kinetics in solid source and gas source molecular beam epitaxy. As a result of these efforts, a coherent research program has been established that stresses the following points: (1) collaborative research among engineering, physical science and materials science faculty specifically in the field of compound semiconductor (GaAs, AlGaAs, InGaAs and InP based) materials with emphasis on heterojunction and quantum well structures; (2) diagnostics of novel optoelectronic devices and materials; (3) interaction with our strong theoretical efforts to identify new directions MBE growth and optoelectronic and nanostructure device physics. Several productive DoD programs have been obtained which utilize the equipment for student training and technical publications. The instrumentation has provided a capability for scientific research that is unique in any U.S. university. Thus the training of students of modern instrumentation to effectively pursue present and future

AD-A226 143

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DoD research directions is progressing successfully. (r.h.)

DESCRIPTORS: (U) *COMPUTER APPLICATIONS, *ELECTROOPTICS, *GROWTH(GENERAL), *SEMICONDUCTORS, ARIZONA, ELECTRICAL PROPERTIES, HETEROJUNCTIONS, INSTRUCTORS, KINETICS, LABORATORIES, MATERIALS, MONITORING, NETWORKS, OPTICAL PROPERTIES, ORIENTATION(DIRECTION), PHOTONS, PHYSICAL SCIENCES, PHYSICS, QUANTUM ELECTRONICS, SOLIDS, SOURCES, STRESSES, STRUCTURES, STUDENTS, TRAINING.

AD-A226 142 12/3

COLORADO STATE UNIV FORT COLLINS DEPT OF STATISTICS

(U) Multivariate Problems of Statistics and Information Theory.

DESCRIPTIVE NOTE: Final rept. 15 Apr 89-14 Apr 90,

APR 90 6P

PERSONAL AUTHORS: Srivastava, Jagdish

CONTRACT NO. AFOSR-88-0159

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0869, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, MATHEMATICAL MODELS, STATISTICS, INFORMATION THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A226 141 12/3 12/2

AMERICAN MATHEMATICAL SOCIETY PROVIDENCE RI

(U) AMS-SIAM Summer Seminar on the Mathematics of Random Media Held in Blacksburg, Virginia on May 29-June 9, 1989.

DESCRIPTIVE NOTE: Final rept. 15 May 89-14 May 90,

MAY 90 24P

PERSONAL AUTHORS: Maxwell, James W.

CONTRACT NO. AFOSR-89-0358, $NSF-DMS88-14807

PROJECT NO. 6177

TASK NO. 57

MONITOR: AFOSR, XF
TR-90-0867, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The twentieth AMS-SIAM Summer Seminar on applied mathematics was held at Virginia Polytechnic Institute and State University, May 29-June 9, 1989. The topic of the seminar was 'The Mathematics of Random Media'. The purpose of the seminar was to provide an overview of the role of applied probability theory in modeling the properties of materials and processes so complex that they can only be described statistically. Four general topics were selected for study; these were effective medium theory, diffusions and Markov processes, interesting particle systems and waves in random media. The seminar was structured so that each topic received about two and one-half days coverage (roughly 12 or 13 hourly presentations). One or two of the hourly talks at the beginning of each segment were aimed at providing general background and orientation for the audience. Keywords: Symposia, Mathematical models, Applied mathematics, Theory. (CP)

DESCRIPTORS: (U) *APPLIED MATHEMATICS, *PROBABILITY, BACKGROUND, MARKOV PROCESSES, MATERIALS, MATHEMATICAL MODELS, MATHEMATICS, MEDIA, PARTICLES, SYMPOSIA, THEORY, VIRGINIA.

IDENTIFIERS: (U) PE62202F, WUAFOSR617757, AMS-SIAM

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AD-A226 141 CONTINUED

Summer Seminar.

AD-A226 076 7/4

DEXTER-HYSOL AEROSPACE INC PITTSBURG CA

(U) At-Resin Research: Biotechnical Support and Heterogeneous Catalysis.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 89-15 Jul 90,

JUL 90 39P

PERSONAL AUTHORS: Sachdeva, Yesh P.

CONTRACT NO. F49620-89-C-0042

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0864, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Four additional batches of polyethylene (PE)-supported palladium catalyst were prepared. These catalysts have been evaluated for the preparation of a diynol addition product 2 starting from 4,4-bis(3-bromophenoxy) diphenyl sulfone 1 (Figure 1). Palladium still leaches into the product. The reaction conditions of palladium complexation with triphenyl phosphine (TPP) were studied. The optimum amount of TPP required in the diynol addition reaction was lowered to a range of one-half as compared to the established procedures. Under the Biotech-Support part of this program, reaction conditions favoring condensation of phenols and aromatic halides were explored using model reactions of m-cresol and dichlorodiphenyl sulfone and difluorobenzophenone. Condensation reactions were faster in the presence of 18-Crown-6 than CsI. Difluorobenzophenone reacted faster than dischlordiphenyl sulfone with m-cresol. The reaction conditions were applied to the condensation of m-hydxroxphenyl acetylene and aromatic dihadlides. (js)

DESCRIPTORS: (U) *CONDENSATION REACTIONS, ADDITION, AROMATIC COMPOUNDS, CATALYSIS, CATALYSTS, CONDENSATION, HALIDES, HETEROGENEITY, PALLADIUM, PHENOLS, PHENYL RADICALS, PHOSPHINE, POLYETHYLENE, RESPONSE.

AD-A226 076 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A226 072 20/4

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF AEROSPACE ENGINEERING

(U) Hypersonic Viscous Flow.

DESCRIPTIVE NOTE: Final rept. 1 Mar 88-31 May 90,

JUL 90 5P

PERSONAL AUTHORS: Cheng, Hsien K.

CONTRACT NO. AFOSR-88-0146

MONITOR: AFOSR, XF
TR-90-0885, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research and documented works on Viscous hypersonic flow theory are summarized and reported. Topic areas where the research has been focused are:(1) a fully viscous version of the shock layer (VSL) and its extension beyond the Navier-Stokes (NS) level based on Grad's thirteen moment equations (2) INVISCID-VISCOUS iteration in hypersonic flows. The development in area 1 has led to a principle which allows correlation of shock layer flow far from translational equilibrium with a corresponding flow based on the NS equations, as substantiated by extensive comparison of direct simulation Monte Carlo and NS-based calculations. The development in area 2 resulted in a triple-deck theory of hypersonic boundary layer under strong wall cooling which exhibits drastically different structure and properties of the triple-deck. (edc)

DESCRIPTORS: (U) *HYPERSONIC FLOW, *VISCOUS FLOW, BOUNDARY LAYER FLOW, COOLING, EQUATIONS, INVISCID FLOW, ITERATIONS, LAYERS, MOMENTS, MONTE CARLO METHOD, NAVIER STOKES EQUATIONS, SHOCK, SIMULATION, THEORY, WALLS.

AD-A226 071 9/3

PRINCETON UNIV NJ PLASMA PHYSICS LAB

(U) Soft X-Ray Laser Development.

DESCRIPTIVE NOTE: Final rept. Ocr 88-Oct 89,

OCT 89 45P

PERSONAL AUTHORS: Suckewer, Szymon

CONTRACT NO. AFOSR-86-0066

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-90-0881

UNCLASSIFIED REPORT

ABSTRACT: (U) A 3mJ, 182-Anstrom soft x-ray laser abased on a recombining plasma was created with an efficiency almost two orders of magnitude higher than the collisionally-pumped Livermore device. In addition, an amplifier section was added, consisting of a 3mm long carbon plasma which yielded a gain of 8 per cm. Keywords: Soft x ray, Plasma, Pumped laser. (jhd)

DESCRIPTORS: (U) *X RAY LASERS, *SOFT X RAYS, PLASMAS(PHYSICS), LASER PUMPING, AIR FORCE RESEARCH.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A8.

AD-A226 070 9/1 20/7 20/8 20/3
20/6 20/14

CALIFORNIA UNIV LOS ANGELES DEPT OF ELECTRICAL SCIENCES AND ENGINEERING

(U) Compact Millimeter-Wave Devices: Cherenkov CARM, Voltage CARM and High Harmonic Gyrotron.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-30 Nov 89,

NOV 89 38P

PERSONAL AUTHORS: Luhmann, Neville C., Jr

CONTRACT NO. AFOSR-86-0199

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR, XF
TR-90-0880, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The dielectric loaded CARM experiments were extremely disappointing. Even with a high quality electron beam, the performance of the device did not improve. The analytical theory of Bragg reflectors was developed. The reflection is found by solving the coupled differential equations by the eigenvalue/eiginvector method. (r.r.h.)

DESCRIPTORS: (U) , BRAGG ANGLE, COUPLING(INTERACTION), DIFFERENTIAL EQUATIONS, EIGENVALUES, ELECTRON BEAMS, MILLIMETER WAVES, REFLECTORS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A8.

AD-A226 066 12/1

HOUSTON UNIV TX DEPT OF MATHEMATICS

(U) A Mixed Finite Element Formulation for the Boundary Controllability of the Wave Equation.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Oct 90,

OCT 90 76P

PERSONAL AUTHORS: Glowinski, R.; Kinton, W.; Wheeler, M. F.

CONTRACT NO. AFOSR-89-0025

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-90-0879

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper introduces the mixed finite element method as a viable numerical procedure for the boundary controllability of the linear wave equation. Another numerical implementation using Galerkin finite elements has been investigated. However, due to approximation problems of the normal derivative on the boundary, the method becomes unstable as the mesh is refined. To correct for the ill-posedness of the approximate problem, a Tychonoff regularization method was implemented. The aforementioned paper also presents other possible remedies; among them is the mixed finite element method. The fixed finite element approximation is a plausible procedure to overcome these difficulties since the derivative at certain nodal values arises naturally from the formulation. (jhd)

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, *WAVE EQUATIONS, BOUNDARIES, CONTROL, FORMULAS(MATHEMATICS), LINEAR DIFFERENTIAL EQUATIONS, MIXING, NODES, NUMERICAL METHODS AND PROCEDURES, VIABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3, Galerkin method.

AD-A226 066

AD-A226 057 20/12 9/3 20/5

AERODYNE RESEARCH INC BILLERICA MA

(U) Development of Laser Spectroscopic Diagnostics to Support Advanced Compound Semiconductor Deposition Techniques.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 87-1 Jun 90,

JUL 90 110P

PERSONAL AUTHORS: Wormhoudt, Joda C.

CONTRACT NO. F49620-87-C-0052

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-0865, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program constructed and demonstrated an apparatus for the development of laser diagnostics for the gas phase molecules involved in semiconductor fabrication techniques, particularly the organometallic chemical vapor deposition of compound semiconductors like gallium arsenide. Work in this apparatus, a flow tube with mirrors for long path tunable infrared diode laser absorption and electrodes for a radio frequency glow discharge, culminated in observations designed to assess the importance of arsenic hydride radicals in the decomposition of organoarsenic compounds. Preliminary observations of fluorocarbon and methane plasmas produced observations of several species which could be compared with models and other observations and which added to knowledge of these systems with their important applications in silicon etching an diamond deposition. The program also resulted in band strength measurements for the methyl and difluorocarbene radicals, using tunable diode laser, dye laser, and fast flow reactor techniques. (R.R.H.)

DESCRIPTORS: (U) *DIAGNOSIS(GENERAL), *DYE LASERS, *GLOW DISCHARGES, *LASER APPLICATIONS, *PLASMAS(PHYSICS), *SEMICONDUCTOR LASERS, *SPECTROSCOPY, *TUNABLE LASERS, ARSENIC, CHEMICAL RADICALS, CHEMICAL REACTIONS,

AD-A226 057

AD-A226 057 CONTINUED

DEPOSITION, DIAMONDS, ELECTRODES, ETCHING, FABRICATION, FLOW, FLUORINATED HYDROCARBONS, GALLIUM ARSENIDES, HYDRIDES, METHANE, METHODOLOGY, MIRRORS, MOLECULES, ORGANOMETALLIC COMPOUNDS, RADIOFREQUENCY, SEMICONDUCTORS, SILICON, SPECTROMETERS, TUBES, VAPOR DEPOSITION, VAPOR PHASES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4.

AD-A226 020 11/4

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Interfacial Studies of Whisker and Coated Fiber Reinforced Ceramic Matrix Composites.

DESCRIPTIVE NOTE: Annual rept. May 89-May 90,

MAY 90 95P

PERSONAL AUTHORS: Brennan, John

CONTRACT NO. F49620-88-C-0062

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0857, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objectives of this program are to characterize the interfacial region in a variety of whisker and coated fiber reinforced glass ceramic matrix composites, and to study how the structure, chemistry, and bonding characteristics of the interface influence composite properties such as strength, toughness, and environmental and thermal stability. During the past year, efforts in the whisker composite area were focused on the investigation of whisker coatings such as carbon and BN on LAS glass ceramic matrix composite properties, fabrication and characterization of calcium aluminosicicate (CAS) matrix/SiC whisker composites, high resolution TEM studies of a variety of techniques, and the evaluation of SiC platelets as an alternate reinforcement to whiskers. Efforts in the coated fiber area were focused on the evaluation of yttria and BN coated NICALON fibers from General Atomics. Results of these studies are presented. Keywords: Ceramic composite interfaces, Whisker reinforced glass ceramics, LAS matrix SiC whisker composites, Coated fiber, Glass ceramic composites. (js)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, BLOOD PLATELETS, BONDING, CALCIUM, CARBON, CERAMIC MATERIALS, CHEMISTRY, COATINGS, ENVIRONMENTS, FIBERS, GLASS, HIGH RESOLUTION, INTERFACES, REGIONS, REINFORCING MATERIALS, SURFACE

AD-A226 020 CONTINUED

PROPERTIES, THERMAL STABILITY, TOUGHNESS, WHISKER COMPOSITES, YTTRIUM OXIDES.

AD-A225 998 5/7

CHICAGO UNIV IL DEPT OF PSYCHOLOGY

(U) Workshop on the Transition from Speech Sounds to Spoken Words.

DESCRIPTIVE NOTE: Final rept. 15 May-15 Nov 89,

JUL 90 24P

PERSONAL AUTHORS: Nusbaum, Howard C.; Goodman, Judith C.

CONTRACT NO. AFOSR-89-0389

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-0894, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Listeners use language-specific knowledge to impose perceptual structure on speech. Since this Knowledge must be learned through linguistic experience, data on the development of speech perception could constrain theories of adult speech perception. This workshop focused on the transitions in the perceptual processing of speech from infancy to adulthood. The workshop consisted of nine presentations over a two-day period in June, 1989. Several researchers argued that dynamic mechanisms are critical for relating the acquisition and use of linguistic of learning and attention were targeted as being critical to the development of speech perception. Further, since listeners appear to use information from several levels of linguistic analysis and to cross-correlate knowledge about perception and production, a complete theory of spoken language understanding must address how different forms of linguistic knowledge are related in perceptual processing. Keywords: Speech perception, Perceptual development, Spoken language, Auditory perception, Word recognition, Phonetics. (js)

DESCRIPTORS: (U) *LANGUAGE, *WORD RECOGNITION, ACQUISITION, ADULTS, AUDITORY PERCEPTION, DYNAMICS, LEARNING, LINGUISTICS, PERCEPTION, PHONETICS, PROCESSING, PRODUCTION, SOUND, SPEECH, THEORY, TRANSITIONS,

AD-A225 998 CONTINUED

WORDS(LANGUAGE), WORKSHOPS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A6.

AD-A225 997 20/7 9/3

DUKE UNIV DURHAM NC DEPT OF PHYSICS

(U) Research on Advanced Sources and Applications.

DESCRIPTIVE NOTE: Final rept. 1 Jul 88-31 Oct 89,

AUG 90 18P

PERSONAL AUTHORS: Madey, John M.; McCormick, Rodney I.

CONTRACT NO. AFOSR-88-0238

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-0895, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress is summarized on the mechanical and shielding systems for a 1 GeV Linac and Storage Ring to drive an UV/XUV Free Electron Laser. Progress is summarized on injector redesign and undulator design. Training and coupling activities are summarized. Keywords: Undulator design, Electron storage ring, Free electron laser. (JHD)

DESCRIPTORS: (U) *FREE ELECTRON LASERS, COUPLING(INTERACTION), DRIVES, ELECTRON BEAMS, MECHANICAL COMPONENTS, RINGS, RADIATION SHIELDING, SOURCES, STORAGE, PARTICLE ACCELERATOR COMPONENTS, ULTRAVIOLET LASERS, FAR ULTRAVIOLET RADIATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1, Storage rings.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A225 996 20/4 14/2

PRINCETON UNIV NJ

(U) Investigation of Supersonic Boundary Layer Transition and Turbulent Structure.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-1 Mar 90,

JUL 90 20P

PERSONAL AUTHORS: Smits, A. J.; Miles, R. B.

CONTRACT NO. AFOSR-89-0091

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0875, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report describes the research progress made possible with the equipment purchased under this grant, and the manpower supplied by Princeton University as part of cost sharing.

DESCRIPTORS: (U) *TURBULENT BOUNDARY LAYER, *SUPERSONIC FLOW, *INSTRUMENTATION, BOUNDARY LAYER TRANSITION, LASER APPLICATIONS, RAYLEIGH SCATTERING, BOUNDARY LAYER FLOW, GAS DYNAMICS, SHOCK WAVES, FLOW SEPARATION, PRESSURE MEASUREMENT, THREE DIMENSIONAL, FLOW VISUALIZATION.

IDENTIFIERS: (U) Nonintrusive instrumentation, PE61102F, WUAFOSR2307A2.

AD-A225 996

AD-A225 992 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Nearby Variables with Nearby Conditional Laws and a Strong Approximation Theorem for Hilbert Space Valued Martingales.

DESCRIPTIVE NOTE: Technical rept.,

APR 89 36P

PERSONAL AUTHORS: Monrad, D.; Philipp, W.

REPORT NO. TR-264

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XA
TR-90-0845, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper focuses on sequences of random vectors which do not admit a strong approximation of their partial sums by sums of independent random vectors. The first part proves conditional versions of the Strassen-Dudley theorem. These are applied to obtain strong invariance principles for vector-valued martingales which, when properly normalized, converge in law to a mixture of Gaussian distributions. Keywords: Mathematical models, Random variables. (cp)

DESCRIPTORS: (U) *HILBERT SPACE, *RANDOM VARIABLES, *APPROXIMATION(MATHEMATICS), INVARIANCE, MATHEMATICAL MODELS, MIXTURES, NORMAL DISTRIBUTION, THEOREMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, Strassen Dudley theorem, *Martingales.

AD-A225 992

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A225 991 12/2

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Interacting Hilbert Space Valued Stochastic Differential Equations and Propagation of Chaos.

DESCRIPTIVE NOTE: Technical rept.,

JUL 90 45P

PERSONAL AUTHORS: Kallianpur, G.; Karandikar, R. L.

REPORT NO. TR-304

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0849, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Interacting Hilbert space valued stochastic differential equations are studied as an extension of Funaki's model for random strings to a system of interacting strings. The martingale problem for the corresponding McKean-Vlasov equation is solved. Special results when H = L squared (G), G, a bounded domain in real numbers are obtained. Keywords: Mathematical equations/models, Differential equations. (cp)

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, *HILBERT SPACE, *INTERACTIONS, EQUATIONS, MATHEMATICAL MODELS, REAL NUMBERS, STOCHASTIC PROCESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, Funaki model, McKean Vlason equation, Chaos..

AD-A225 990 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Characterizations of One-Sided Fractional Levy Motions,

MAR 90 16P

PERSONAL AUTHORS: Cambanis, S.; Maejima, M.

REPORT NO. TR-289

CONTRACT NO. F49628-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0844, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The only self-similar stable processes with stationary increments whose left-equivalent (resp. right-equivalent) stationary processes are nonanticipating (resp. fully anticipating) moving averages are the left (resp. right) linear fractional Levy motions. (JHD)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, MEAN, MOTION, STATISTICAL PROCESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, Levy Motions, Fractional Levy Motion.

AD-A225 989 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Hoelder Continuity of Sample Paths of Some Self-Similar Stable Processes.

DESCRIPTIVE NOTE: Technical rept.,

MAR 90 18P

PERSONAL AUTHORS: Kono, N.; Maejima, M.

REPORT NO. TR-290

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0846, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Hoelder continuity of sample paths of the following classes of stochastic processes is examined: (1) Processes satisfying Kolmogorov's moment condition, (2) self-similar stable processes with stationary increments and (3) harmonizable fractional processes.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, MOMENTS, MOMENTS, STOCHASTIC PROCESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A225 989

AD-A225 971 20/4 12/2

ILLINOIS INST OF TECH CHICAGO FLUID DYNAMICS RESEARCH CENTER

(U) Coupled Experimental and Theoretical Investigations of Instability, Chaos and Turbulence in an Axisymmetric Jet Flow.

DESCRIPTIVE NOTE: Final technical rept. Apr 86-Oct 89,

JUL 90 396P

PERSONAL AUTHORS: Corke, Thomas C.; Nagib, Hassan M.; Rosenblatt, Simon

CONTRACT NO. AFOSR-86-0165

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0897, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This work focused on instability, routes to chaos, and transition to turbulence in an axisymmetric jet. The research focused on three basic tasks. The first involved the search for evidence of low dimensional strange attractors in a naturally excited condition. The theoretical analog was the construction of low-dimensional model equations for this flow. The second involved 3-D (non-axisymmetric) periodic forcing of the jet to lead to the enhanced growth of 3-D modes. This was to focus on natural resonant mechanisms involving natural instability modes of the shear layer and jet core. The theoretical analysis for this part was to predict the conditions for the most resonant interactions, which would maximize our ability to control the jet outcome. The third task was to integrate the previous tasks to exploit important mode interactions which lead to strong nonlinear regimes and or random or chaotic states. In this phase, we accomplished this through intrinsic forcing of the jet by 'enhanced feedback'. The results of the work have covered all these tasks, and yielded many new fundamental results basic to dynamical systems with feedback.

AD-A225 971

AD-A225 971 CONTINUED

DESCRIPTORS: (U) *JET FLOW, *AXISYMMETRIC FLOW, *TURBULENCE, BIFURCATION(MATHEMATICS), EXCITATION, FEEDBACK, RESONANCE, TRANSITIONS, DYNAMICS, INTERACTIONS, MATHEMATICAL PREDICTION, CRITICALITY(GENERAL), RANDOM VARIABLES, THEORY, STABILITY.

IDENTIFIERS: (U) Chaos(Mathematics), *Instability, Global instability, Hopf bifurcation, Critical values, Attractors(Mathematics), Strange attractors, WUAFOSR2307A2, PE61102F.

AD-A225 967 7/6

SRI INTERNATIONAL MENLO PARK CA

(U) Synthesis of Energetic Acid Labile LOVA Binders.

DESCRIPTIVE NOTE: Final rept.,

AUG 90 26P

PERSONAL AUTHORS: Narang, Subhash C.; Schmitt, Robert J.

CONTRACT NO. F49620-86-K-0012

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0842, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have prepared several totally aliphatic polycarbonate blocks and measured their glass transition temperatures and melting points. We have performed differential scanning calorimetry (DSC) to test the ability of these polymers to endothermically decompose in the presence of acid and/or heat. We have linked these blocks to give us an aliphatic polycarbonate ABA block copolymer. We have prepared several poly(orthoformate) polymers, which endothermically decompose in the presence of acid. We have prepared ABA block copolymers using poly(orthoformates) and BAMO as the blocks and studied their LOVA properties. We have devised a simple, economical approach to the synthesis of polynitramine binders over those taken previously. Keywords: Propellants, Low vulnerability explosives, Polycarbonates, Polynitramines, Explosives. (jes)

DESCRIPTORS: (U) *BLOCK COPOLYMERS, *EXPLOSIVES, ACIDS, ALIPHATIC COMPOUNDS, BINDERS, CALORIMETRY, ENERGETIC PROPERTIES, GLASS, LOW LEVEL, MELTING POINT, NITRAMINES, POLYCARBONATES, POLYMERS, PROPELLANTS, SCANNING, SYNTHESIS, TRANSITION TEMPERATURE, VULNERABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, LPN-SRI-2092.

AD-A225 961 12/3 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Sampling Designs for Estimating Integrals of Stochastic rocesses Using Quadratic Mean Derivatives.

DESCRIPTIVE NOTE: Technical rept.,

APR 90 37P

PERSONAL AUTHORS: Benhenni, Karim; Cambanis, Stamatis

REPORT NO. TR-293

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0852, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The problem of estimating the integral of a stochastic process by linear estimators based on observations of the process and its existing quadratic mean (q.m.) derivatives at a finite number of sampling points is considered. The process is assumed to have exactly K q.m. derivatives, K=0, 1,2,..... The asymptotic performance of optimal-coefficient estimators that depend on an inverse matrix is determined for regular sampling designs under slightly different assumptions than those in Sacks and Ylvisaker (1970). Simple-coefficient estimators based on a trapezoidal rule with a correction term that depends on the q.m. derivatives of the process at all sampling points of a regular design are introduced. Their asymptotic performance is identical to that of the optimal-coefficient estimators. Keywords: Linear equations, Stochastic processes, Integrals. (cp)

DESCRIPTORS: (U) *STATISTICAL SAMPLES, *DERIVATIVES(MATHEMATICS), *ESTIMATES, INTEGRALS, LINEAR ALGEBRAIC EQUATIONS, MEAN, QUADRATIC EQUATIONS, SAMPLING, STOCHASTIC PROCESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A225 961

AD-A225 960 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On the Spectral SLLN and Pointwise Ergodic Theorem in L alpha.

DESCRIPTIVE NOTE: Technical rept.,

JUL 90 28P

PERSONAL AUTHORS: Houdre, Christian

REPORT NO. TR-302

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0848, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The criterion, obtained by Gaposhkin, for a (weakly) stationary process to satisfy the strong law of large numbers (SLLN) has had various extensions, in particular to second order non-stationary harmonizable processes. Outside of the L squared-framework, it has also been studied for Fourier transforms of independently scattered symmetric alpha-stable (S alpha S) measures. It is shown here that via this spectral approach, neither the L squared - requirement nor any distributional assumption are indispensable in establishing the SLLN. Only the harmonic representation with respect to a bounded (in a sense to be made precise) random measure is crucial. This is illustrated in this work, where we obtain conditions for the SLLN to hold for some classes of processes with finite alpha sub th-moment, which, in addition, are Fourier transforms. It is well known that stationary processes and unitary groups of operators are interchangeable, and so are the corresponding strong law and pointwise ergodic theorem. This type of duality between operators and processes carries over to our framework, although in general, the operators are not shifts. It is thus, also the purpose of our work to obtain the pointwise ergodic theorem, for some new

AD-A225 960

AD-A225 960 CONTINUED

classes of operators between L sub alpha-spaces, 1 < alpha < + infinity. Keywords: Ergodic properties, Random fields. (KR)

DESCRIPTORS: (U) *ERGODIC PROCESSES, *STATISTICAL PROCESSES, FOURIER TRANSFORMATION, HARMONICS, MEASUREMENT, STATIONARY, THEOREMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, SLLN(Strong Law of Large Numbers).

AD-A225 959 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) *Integrability of Stable Processes.*

DESCRIPTIVE NOTE: Technical rept.,

JUN 90 24P

PERSONAL AUTHORS: Samorodnitsky, Gennady

REPORT NO. TR-301

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0847, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Let nu be a alpha-finite Borel measure on a separable metric space T, and let (X(t) t epsilon T) be a measurable alpha-stable process, 0<a<2. Sample path integrals of a certain type arise in many situations, e.g. in multiple stochastic stable integration (Rosinski and Woyczyski 1987), in inversion formulae for the Fourier transform of stable noise (Cambanis 1988), in integral transformations between stationary and stationary increments stable processes (Cambanis and Maejima 1990) and others. It is important, therefore, to know exactly when the above integral is finite. Although much is known about this question, certain things appear to have been unknown in the case p<1 and even the known results are scattered in the literature and have never been put together, mainly because different cases have been handled using very different tools, varying from path order analysis to geometry of certain Banach spaces. As a result, researchers working with stable processes have had to justify in each case existence of sample path integrals (see Cambanis and Maejima (1990) for a recent example). It is our purpose in this paper, therefore, to give necessary and sufficient conditions for sample path integrability of stable processes in the case which has been to use form. (kr)

AD-A225 959 CONTINUED

DESCRIPTORS: (U) *INTEGRATION, *STABILITY, *STOCHASTIC PROCESSES, BANACH SPACE, FORMULAS(MATHEMATICS), FOURIER TRANSFORMATION, INTEGRALS, INVERSION, NOISE, PATHS, TRANSFORMATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A225 959

AD-A225 945 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Structure of a Dimer Ketone Formed via Fe(CO)5-Promoted Coupling of 7-(p-Cyanophenoxy)Norbornadiene to Carbon Monoxide,

90 4P

PERSONAL AUTHORS: Flippen-Anderson, Judith L.; Gilardi, Richard; George, Clifford; Marchand, Alan P.; Dave, Paritosh R.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0888, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Acta Crystallographica, Section C: Crystal Structure Communications, vc46 p807-809 1990.

ABSTRACT: (U) As part of an ongoing study of the thermal reactions of iron carbonyls with 7-substituted norbornadienes (Marchand & Hayes, 1977; Marchand, Earlywine & Heeg, 1986), the reactions of Fe(CO)5 and of Fe2(CO)9 with 7-(p-cyanophenoxy)norbornadiene (1) were investigated. Compound (1) was synthesized via palladium(II)-promoted valence isomerization (Patrick & Bechtold, 1984) of 3-(p-cyanophenoxy)quadricylane. Thermal reaction with Fe(CO)5, performed in refluxing di-n-butyl ether, resulted primarily in alkyl-oxygen cleavage in the substrate, thereby affording p-cyanophenol in 23% yield. The corresponding reaction with Fe2(CO)9, performed in refluxing benzene, afforded unreacted (56%), a cage dimer (2.9%), and a dimer ketone (6.2%). Reprints. (jes)

DESCRIPTORS: (U) *BENZENE, CARBON MONOXIDE, DIMERS, HEAT, IRON, KETONES, REACTION KINETICS, REPRINTS, SUBSTRATES, THERMAL PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A225 945

AD-A225 938 20/5

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) One-Color Photolysis-Ionization Study of HN3: The N2 Fragment Internal Energy Distribution and mu-v-J Correlations,

JUL 90 12P

PERSONAL AUTHORS: Chu, Jan-Jon; Marcus, Peter; Dagdigian, Paul J.

CONTRACT NO. F49620-88-C-0056

MONITOR: AFOSR, XF
TR-90-0863, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in The Jnl. of Physical Chemistry, v93 n1 p257-267, 1 Jul 90.

ABSTRACT: (U) A one-color photolysis/ionization study of the photodissociation of hydrazoic acid near 283 nm has been carried out. The N2 and NH products have both been detected in a state-specific manner by resonance-enhanced multiphoton ionization (REMPI) in a time-of-flight mass spectrometer. The N2 fragments were observed in the v-=0 vibrational mainfold and were found to be highly rotationally excited, with an average rotational excitation of 0.79 eV. The correlation parameter for N2 was determined to be positive and approximately equal to 0.5, indicating that the angular momentum vector J tends to be parallel with the transition dipole. Relatively little rotational energy was found in the NH product. Keywords: Photolysis, Laser ionization, Hydrazoic acid. (jes)

DESCRIPTORS: (U) *MASS SPECTROMETERS, CORRELATION, ENERGY, FLIGHT, HYDRAZOIC ACID, IONIZATION, LASERS, PARAMETERS, PHOTODISSOCIATION, PHOTOLYSIS, ROTATION, TIME.

AD-A225 915 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Lewis Acid Promoted Reactions of 11-Methylenepentacyclo(5.4.0.02,6.03,10.05,9)undecan-8-one and Pentacyclo(5.4.0.02,6.03,10.05,9)undecan-8-one with Ethyl Diazoacetate,

90 7P

PERSONAL AUTHORS: Marchand, Alan P.; Reddy, S. P.; Rajapaksa, D.; Ren, Chien-Tai; Watson, William H.

CONTRACT NO. AFSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0892, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The reaction of pentacyclo undecane-8,11-dione with ethyl diazoacetate (EDA, 1 equiv) in the presence of F3B.OEt2, when performed at -78 C, afforded three products: diethyl 3,6-dioxopentacyclo tridecane-2,7-dicarboxylate, ethyl 2,6-dioxopentacyclo-dodecane-3-carboxylate (7.4%), and a novel heterocyclic compound, (31%), whose structure was established by X-ray structural analysis. Keywords: Ring homologation reactions, Substituted pentacycloundecanes, Regioselectivity, Ring expansion. (jes)

DESCRIPTORS: (U) *HETEROCYCLIC COMPOUNDS, EXPANSION, RINGS, STRUCTURAL ANALYSIS, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A225 914 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Structure of a Dimer Ketone Formed via Iron Carbonyl-Promoted Coupling of 7-Phenylnorbornadiene with Carbon Monoxide.

90 4P

PERSONAL AUTHORS: Watson, William H.; Nagl, Ante; Marchand, Alan P.; Vidyasagar, V.; Goodin, David B.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0887, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Acta Crystallographica, Section C: Crystal Structure Communications, vc46 p1127-1129 1990.

ABSTRACT: (U) A small, colorless crystal of dimensions 0.07 x 0.15 x 0.60 mm was mounted on a Nicolet update of a P21 diffractometer; data collected in the omega mode using a variable scan rate and graphite-monochromated Mo K alpha radiation; lattice parameters from a least-squares refinement of 25 reflections; no systematic absences and intensity statistics consistent with space group showed a random maximum 2% variation during data collection. Reprints. (jes)

DESCRIPTORS: (U) *KETONES, CARBON MONOXIDE, DATA ACQUISITION, DIMERS, INTENSITY, LEAST SQUARES METHOD, RATES, REFINING, REPRINTS, SCANNING, STATISTICS, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A225 913 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Structure of a Pentacyclic Cage Enone,

90 4P

PERSONAL AUTHORS: Watson, William H.; Kashyap, Ram P.; Marchand, Alan P.; Vidyasagar, V.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0893, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Acta Crystallographica, Section C: Crystal Structure Communications, vc46 p926-928 1990.

ABSTRACT: (U) As part of a program this is concerned with the synthesis and chemistry of novel polycyclic cage compounds the Wittig reaction of 1-phenylpentacyclo undecane-8,11-dione has been studied. However, only one was isolated (48% yield). A colorless crystal of dimensions 0.65 x 0.20 x 0.15 mm was mounted on a Nicolet update of a P21 diffractometer; data collected in the omega mode using a variable scan rate. Reprints. (jes)

DESCRIPTORS: (U) *POLYCYCLIC COMPOUNDS, CHEMISTRY, CLATHRATE COMPOUNDS, RATES, REPRINTS, SCANNING, SYNTHESIS, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A225 912 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Synthesis and Reactions of Meso- and dl-D(3)-Trishomocubylidene-D(3)-Trishomocubane,

90 10P

PERSONAL AUTHORS: Marchand, Alan P.; Reddy, G. M.; Deshpande, Mahendra N.; Watson, William H.; Nagl, Ante

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0890, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v112 n9 p3521-3529 1990.

ABSTRACT: (U) Titanium-doped reductive coupling of D3-trishomocubano-affords meso- and dl-D3-trishomocubylidene-D3-trishomocubane (2a and 2b, 60%) and D3-trishomocubanol (3, 25%). The structures of 2a and 2b were elucidated by X-ray crystallographic methods. Reaction of a ca. 1:1 mixture of 2a and 2b with a chloroform solution of trifluoroacetic acid at room temperature for 2.5 h afforded the corresponding 1,2-adduct (4b, 39%) along with isomerically pure, unreacted 2a (46%). The corresponding reaction of 2a, when performed at reflux for 48 h, afforded an extensively rearranged spirocyclic trifluoroacetate adduct, 4a (30%), along with recovered 2a (40%). The structure of 4a was established via X-ray crystallographic analysis of the corresponding alcohol, 5, that resulted via lithium aluminum hydride reduction of 4a. Electrophilic bromination of 2b with Br2-CCl4 solution proceeded smoothly at room temperature to produce the corresponding 1,2-adduct, 9 (80%), whose structure was established unambiguously by X-ray crystallography. Keywords: Titanium reductive coupling, Trishomocubanone, Electrophilic addition, Alkenes. (jes)

DESCRIPTORS: (U) *CHLOROFORM, ADDITION REACTIONS, ALKENES, ALUMINUM COMPOUNDS, CRYSTALLOGRAPHY, ELECTRONS,

AD-A225 912 CONTINUED

LITHIUM HYDRIDE, REDUCTION, ROOM TEMPERATURE, SOLUTIONS(GENERAL), SYNTHESIS, X RAY DIAGNOSTICS, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A225 910 7/2

MASSACHUSETTS INST OF TECH CAMBRIDGE CENTER FOR MATERIALS SCIENCE AND ENGINEE RING

(U) Fundamental Studies of Near Surface Modification of Carbon Fibers.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-30 Apr 90,

JUN 90 16P

PERSONAL AUTHORS: Dresselhaus, M. S.; Dresselhaus, G.

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0859, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A summary of work carried out under the entire duration of this contract on 'Fundamental Studies of Near Surface Modification of Carbon Fibers' from 9/1/85 to 4/30/90 is presented. Keywords: Carbon fibers, Properties of carbon fibers, Intercalated carbon fibers, Carbon fibers.

DESCRIPTORS: (U) *CARBON FIBERS, MODIFICATION, SURFACES, CHEMICAL REACTIONS, HYDROCARBONS, MEMBRANES.

IDENTIFIERS: (U) PR61102F, WUAFOSR2303A3.

AD-A225 910

AD-A225 903 7/3

WASHINGTON UNIV SEATTLE DEPT OF CHEMISTRY

(U) Synthesis of Vanadium Niobium, and Tantalum Silylimido Complexes and Reactivity of Their Nitrogen-Silicon Bonds,

90 5P

PERSONAL AUTHORS: Jones, Carolyn M.; Lerchen, Megan E.; Church, Carolyn J.; Schomber, Beth M.; Doherty, Nancy M.

CONTRACT NO. AFOSR-87-0362

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0896, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v29 p1679-1682, 1990.

ABSTRACT: (U) The utility of silicon compounds in synthetic organic chemistry has long been recognized. Silicon's low electronegativity, its ability to expand its coordination sphere, and its strong bonds to electronegative elements allow it to serve in a variety of roles in the reactions of organic compounds. Silyl substituents can be employed to direct the course of reactions, to activate substrates, or to protect otherwise reactive sites in molecules. More recently, creative, creative applications of silyl groups in the chemistry of organometallic inorganic complexes have begun to appear, from the synthesis of reactive metal hydroxymethyl compounds via the (trimethylsiloxy) methyl ligand to the substitution of sulfido for oxo ligands at metal centers using hexamethyldisilthiane. Organic, Chemistry, Reprints. (jes)

DESCRIPTORS: (U) *ORGANIC CHEMISTRY, BONDING, CHEMISTRY, COMPLEX COMPOUNDS, CREATIVITY, INORGANIC COMPOUNDS, LIGANDS, METALS, METHYL RADICALS, MOLECULES, NIOBIUM, ORGANIC COMPOUNDS, ORGANOMETALLIC COMPOUNDS, REACTIVITIES, REPRINTS, SILICON COMPOUNDS, SITES, SPHERES, SUBSTRATES, SYNTHESIS, SYNTHESIS(CHEMISTRY), TANTALUM, VANADIUM.

AD-A225 903

AD-A225 903 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A225 871 6/2

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Convergence of One-Dimensional Diffusion Processes to a Jump Process Related to Population Genetics.

DESCRIPTIVE NOTE: Technical rept.,

JUN 90 34P

PERSONAL AUTHORS: Iizuka, M.; Ogura, Y.

REPORT NO. TR-300

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0855, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A conjecture on the convergence of diffusion models in population genetics to a simple Markov chain model is proved. The notion of bi-generalized diffusion processes and their limit theorems are used systematically to prove the conjecture. Three limits; strong selection - weak mutation limit, moderate selection - weak mutation limit, weak selection - weak mutation limit are considered for typical diffusion models in population genetics. (JES)

DESCRIPTORS: (U) *GENETICS, CONVERGENCE, DIFFUSION, LIMITATIONS, LOW STRENGTH, MARKOV PROCESSES, MATHEMATICAL MODELS, MODELS, MUTATIONS, ONE DIMENSIONAL, POPULATION, SELECTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A225 870 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Bootstrapping the Sample Mean for Data with Infinite Variance.

DESCRIPTIVE NOTE: Technical rept.,

MAY 90 44P

PERSONAL AUTHORS: Wu, Wei; Carlstein, Edward; Cambanis, Stamatis

REPORT NO. TR-296

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0853, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) When data comes from a distribution belonging to the domain of attraction of a stable law, Athreya (1987a) showed that the bootstrapped sample mean has random limiting distribution, implying that the naive, bootstrap could fail in the heavy-tailed case. The goal here is to classify all possible limiting distributions of the bootstrapped sample mean when the sample comes from a distribution with infinite variance, allowing the broadest possible setting for the (nonrandom) scaling, the resample size, and the mode of convergence (in law). The limiting distributions turn out to be infinitely divisible with possibly random Levy measure, depending on the resample size. An averaged-bootstrap algorithm is then introduced which eliminates any randomness in the limiting distribution. Finally, it is shown that (on the average) the limiting distribution in the domain of (partial) attraction of a stable law. (Author) (kr)

DESCRIPTORS: (U) *STATISTICAL SAMPLES, *MEAN, CONVERGENCE, DISTRIBUTION, LIMITATIONS, STABILITY, VARIATIONS.

AD-A225 870 CONTINUED.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, *Bootstrapping, *Bootstrap hypothesis.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A225 869 12/2

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On the Upper and Lower Classes for Stationary Gaussian Random Fields on Abelian Groups with a Regularly Varying Entropy.

DESCRIPTIVE NOTE: Technical rept.,

JUN 90 16P

PERSONAL AUTHORS: Albin, J. M.

REPORT NO. TR-299

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0854, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A complete and relatively explicit characterization is given for the upper and lower classes for a general stationary Gaussian radom field. (jhd)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *GROUPS(MATHEMATICS), ENTROPY.

IDENTIFIERS: (U) Abelian Groups, PE61102F, WUAFOSR2304A5.

AD-A225 812 12/6 12/1

COLUMBIA UNIV NEW YORK DEPT OF MATHEMATICS

(U) Applications of Massive Mathematical Computations.

DESCRIPTIVE NOTE: Final technical rept. 30 Sep 87-29 Jun 90,

APR 90 63P

PERSONAL AUTHORS: Chudnovsky, David V.

CONTRACT NO. F49620-87-C-0113

PROJECT NO. 6120

TASK NO. DO

MONITOR: AFOSR, XF
TR-90-0862, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period of the grant our group has been using super-computers and parallel machines to solve important, large and realistic problems. A distinctive characteristic of these problems, apart from their sheer size, is that they required the development of new algorithms which will be useful for other mathematical and physical problems, as well as for improvement of computer performance and reliability. (author). (KR)

DESCRIPTORS: (U) *COMPUTATIONS, *SUPERCOMPUTERS, *PARALLEL PROCESSORS, ALGORITHMS, COMPUTERS, MATHEMATICAL ANALYSIS, MATHEMATICS, PERFORMANCE(ENGINEERING), PHYSICAL PROPERTIES, RELIABILITY.

IDENTIFIERS: (U) PE61101E, WUAFOSR6120DO.

AD-A225 789 11/4

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND MATERIALS CENTER

(U) Studies of Mode I and Mode II Delamination Using a J-Integral Analysis and In-Situ Observations of Fracture in the SEM.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 84-31 Dec 89,

JUL 90 148P

PERSONAL AUTHORS: Bradley, W. L.; Corleto, C. R.; Goetz, D. P.

REPORT NO. MM-5021-90-7

CONTRACT NO. AFOSR-84-0064

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-90-0874

UNCLASSIFIED REPORT

ABSTRACT: (U) The mode I and II delamination of multi-directional composite laminates have been studied using a J-integral approach. The analytical and experimental formalism to apply the J-integral to delamination have been developed and verified on three different composite material systems with matrix toughness varying from very brittle to very tough. Large deflections and rotations, midplane straining and distributed damage are taken into account in the methodology. The experimental conditions under which a path independent J may be measured have been established. The effect of several variables including specimen geometry, stacking sequence, and material constitutive behavior on the J-Moment-at-the-crack-tip relationship have been determined. Multidirectional composite laminates are both more susceptible to far field damage in the off-axis plies and less stiff than undirectional layups. These two factors cause a greater tendency to geometric and material nonlinearity in delamination testing. The use of a traditional G approach to characterize fracture behavior

of such laminates gives artificially high indications of the delamination resistance. (JES)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, DAMAGE, DEFLECTION, DELAMINATION, DIRECTIONAL, DISTRIBUTION, FAR FIELD, FRACTURE(MECHANICS), GEOMETRY, J INTEGRALS, LAMINATES, MATERIALS, NONLINEAR SYSTEMS, RESISTANCE, SEQUENCES, STACKING, TEST AND EVALUATION.

IDENTIFIERS: (U) WUAFOSR2302B2, PE61102F.

AD-A225 762 9/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Investigation of New Semiinsulating Behavior of III-V Compounds.

DESCRIPTIVE NOTE: Final rept. 16 Aug 88-23 Feb 90,

FEB 90 50P

PERSONAL AUTHORS: Lagowski, Jacek

CONTRACT NO. AFOSR-86-0342

PROJECT NO. 2306

TASK NO. B!

MONITOR: AFOSR, XF
TR-90-0872, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our investigation of defect interactions and properties related to semiinsulating behavior of IIIV semiconductors resulted in about twenty original publications, six doctoral thesis, one masters thesis and numerous conference presentations. The studies of new compensation mechanisms involving transition metal impurities have defined direct effects associated with deep donor/acceptor levels acting as compensating centers. Electrical and optical properties of vanadium and titanium levels were determined in GaAs, InP and also in ternary compounds InGaAs. The experimental data provided basis for the verification of chemical trends and the VRBE method. They also defined compositional range for III-V mixed crystals whereby semiinsulating behavior can be achieved using transition elements deep levels and a suitable codoping with shallow donor/acceptor impurities. (jes)

DESCRIPTORS: (U) *ELECTRICAL PROPERTIES, CHEMICALS, COMPENSATION, COMPOSITION(PROPERTY), CRYSTALS, ELECTRON ACCEPTORS, EXPERIMENTAL DATA, GROUP III COMPOUNDS, GROUP V COMPOUNDS, IMPURITIES, INTERACTIONS, MIXING, OPTICAL PROPERTIES, PATTERNS, SEMICONDUCTORS, SHALLOW DEPTH, TERNARY COMPOUNDS, TITANIUM, TRANSITION METALS, VANADIUM, VERIFICATION.

AD-A225 762 CONTINUED

IDENTIFIERS: (U) WUAFOSR2306B1, PE61102F.

AD-A225 760 5/1

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC

(U) Research Proposal Quarterly Status Report.

DESCRIPTIVE NOTE: Quarterly rept. Apr-Jun 90,

JUL 90 59P

PERSONAL AUTHORS: Tyrrell, Debra L.

MONITOR: AFOSR, XF
TR-90-0841, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Research Proposal Quarterly Status Report lists all the research proposals received by AFOSR in the previous six months along with the action taken (Initiated, Declined or Withdrawn) on each report. The report is divided into two parts. The Institution index lists proposals alphabetically by institution. This is followed by a more detailed listing by Directorate, and by Program Manager within the Directorate. This report is designed to inform other Government sponsoring agencies of the proposals received by the AFOSR and the action taken on these proposals. Readers must keep in mind that declined proposals should not necessarily be considered as scientifically unacceptable; many declinations result from a lack of funds or as a result of special programmatic emphasis.

DESCRIPTORS: (U) *RESEARCH MANAGEMENT, AIR FORCE RESEARCH, CONTRACT PROPOSALS.

IDENTIFIERS: (U) Research proposals.

AD-A225 760

AD-A225 738 20/5 9/3 20/9

SRI INTERNATIONAL MENLO PARK CA MOLECULAR PHYSICS CENTER

(U) International Conference on the Physics of Electronic and Atomic Collisions (14th) Held in Palo Alto, California on 24-30 July 1985 (Electronic and Atomic Collisions. Invited Papers),

JUL 85 838P

PERSONAL AUTHORS: Lorents, D. C.; Meyerhof, W. E.; Peterson, J. R.

MONITOR: AFOSR
TR-90-0784

UNCLASSIFIED REPORT

Availability: North-Holland Publishing Company, 52 Vanderbilt Ave., New York, NY 10017. HC $200.00. No copies furnished by DTIC/NTIS.

SUPPLEMENTARY NOTE: See also abstracts of contributed papers, AD-A163 497.

ABSTRACT: (U) Symposia on topics of strong current interest included Dynamics of Photo- and Electron-Capture Dissociation, Energy Transfer Processes Involving Polarized Atom Collisions, State Resolved Capture by Multicharged Ions, and Multiphoton Ionization. New techniques and applications also continue to be developed that provide vitality and new directions to the field. For example, the recent progress on the laser cooling of atoms and its possible application to collision physics was described as well as progress in producing beams of low energy positrons and polarized electrons. The scope of the conference has broadened in a natural way as the field has progressed, the problems of interest have changed, and the tools at our disposal have improved. This evolution was particularly evident at this conference from the increased attention being given to the role of exit channel spectroscopy and decay processes in all types of collisions whether they were excited with ions, electrons, or photons. It is exemplified by the photo excitation processes in which it is possible to prepare well-specified systems on which to conduct half-collision experiments. Thus, the exit channels of many types of collision processes, such as autoionization, dissociation, and detachment, are being investigated on a

AD-A225 738

AD-A225 738 CONTINUED

detail previously unavailable. This research is possible in part because photon sources such as synchrotrons and lasers have become generally available and useful to many researchers. (jhd)

DESCRIPTORS: (U) *PHOTODISSOCIATION, *ELECTRON CAPTURE, *LASER APPLICATIONS, *PHOTOIONIZATION, ATOMIC BEAMS, CHANNELS, COOLING, DECAY, DISPOSAL, DYNAMICS, ELECTRONS, ENERGY TRANSFER, EXCITATION, IONIZATION, IONS, LOW ENERGY, ORIENTATION(DIRECTION), PARTICLE COLLISIONS, PHOTONS, POLARIZATION, POSITRONS, SOURCES, ELECTRON SPECTROSCOPY, SYMPOSIA, SYNCHROTRONS, VALENCE.

IDENTIFIERS: (U) Autoionization.

AD-A225 737 20/14

PROMETHEUS INC SHARON MA

(U) New Approaches to Beamforming, Null Steering, and Filtering.

DESCRIPTIVE NOTE: Final rept.1 Dec 88-31 Mar 90,

JUL 90 207P

PERSONAL AUTHORS: Barrett, Michael J.; Benedetto, John J.; Boyd, Stephen; Byrnes, James S.; Giroux, Andre

CONTRACT NO. F49620-88-C-0028

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-0866, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report consists of ten sections. The first is a report describing our abilities in the co-site radio frequency interference (RFI) problem. The second is the paper Heisenberg Wavelets and the Uncertainty Principle, which will be expanded upon and submitted to the appropriate technical journal. The third is a revised version of the paper A Multidimensional Wiener-Wintner Theorem and Spectrum Estimation, which will appear shortly in the Transactions of the American Mathematical Society. The fourth is the expository paper Problems on Polynomials with Restricted Coefficients Arising from Questions in Antenna Theory, to appear shortly in the Proceedings of the 1989 NATO Advanced Study Institute on Fourier Analysis and its Applications. The fifth is the paper An Ideal Omnidirectional Transmitting Array, and Optimal Peak Factor Array, for Less Than Half-wavelength Spacing, to be submitted shortly to the IEEE Transactions on Antennas and propagation. The sixth is the revised paper Properties on the Unit Circle of Polynomials with Unimodular Coefficients, which just appeared in the Proceedings of the American Mathematical Society. The seventh gives an overview of awd, which is our new method of choosing shading coefficients, based on a convex programming approach. The eight is the latest revision of the paper A

AD-A225 737 CONTINUED

Specification Language Approach to Solving Convex Antenna Weight Design Problems, which will be submitted shortly to the appropriate technical journal. The ninth is version 3.0 of the awd User's Manual, incorporating several improvements which have been added recently. (SDW)

DESCRIPTORS: (U) *BEAM FORMING, *STEERING, *FILTERS, ANTENNAS, ARRAYS, CIRCLES, COEFFICIENTS, CONVEX SETS, ESTIMATES, FOURIER ANALYSIS, LANGUAGE, LIMITATIONS, MATHEMATICAL PROGRAMMING, MATHEMATICS, NULLS(AMPLITUDE), OMNIDIRECTIONAL, OPTIMIZATION, PAPER, PEAK VALUES, PERIODICALS, POLYNOMIALS, SHADOWS, SPECIFICATIONS, SPECTRA, THEORY, TRANSMITTING, UNCERTAINTY, USER MANUALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR3005A1.

AD-A225 737

AD-A225 681 9/1

ARIZONA STATE UNIV TEMPE

(U) Dynamic Compensation-Based Adaptive Control.

DESCRIPTIVE NOTE: Final technical rept. 5 Jul 87-14 Jul 88,

NOV 88 7P

PERSONAL AUTHORS: Byrnes, Christopher I.

CONTRACT NO. AFOSR-85-0224

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-89-0587, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Recently derived necessary conditions, and related sufficient conditions, suggest that adaptive control can be used for systems having nonlinear and/or flexible, potentially extending adaptive control far beyond the existing scenarios. This report documents research in adaptive stabilization of certain infinite dimensional linear systems in state space form and an extension to the stabilization and control of distributed parameter systems, modelled as boundary value systems, using point actuators and sensors. Research on nonlinear stabilization and control is also described leading to the formulation and partial solution of feedback stabilization about attractors as both an important extension of classical equilibrium analysis and as an important tool in more sophisticated control tasks such as asymptotic tracking and disturbance rejection.' Keywords: Adaptive control, Stabilization, Dynamic compensation, Nonlinear control. (Author) (kr)

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, ACTUATORS, ADAPTIVE SYSTEMS, BOUNDARIES, COMPENSATION, CONTROL, DETECTORS, DISTRIBUTION, DYNAMICS, EQUILIBRIUM(GENERAL), FEEDBACK, LINEAR SYSTEMS, NONLINEAR SYSTEMS, PARAMETERS, REJECTION, SOLUTIONS(GENERAL), STABILIZATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A225 681

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A225 595 12/2

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Propagation of Chaos and the McKean-Vlasov Equation in Duals of Nuclear Spaces.

DESCRIPTIVE NOTE: Technical rept.,

MAY 90 49P

PERSONAL AUTHORS: Chiang, T. S.; Kallianpur, G.; Sundar, P.

REPORT NO. TR-298

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0780, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A system of interacting diffusion processes taking values in the dual of nuclear spaces is considered. We prove that under suitable conditions the system has a unique solution and its empirical distributions will converge as n approaches infinity to the solution of the corresponding McKean-Vlasov equation. An application to a neurophysiological model is also given. Keywords: Stochastic processes, Differential equations, Mathematical equations, Propagation of chaos. (cp)

DESCRIPTORS: (U) *PROPAGATION, *STOCHASTIC PROCESSES, DIFFERENTIAL EQUATIONS, DIFFUSION, DISTRIBUTION, EQUATIONS, INTERACTIONS, MATHEMATICS, MATHEMATICAL MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, *McKean Vlason equation, Chaos, Nuclear spaces.

AD-A225 588 9/1 20/12

HOWARD UNIV WASHINGTON DC

(U) Development of Short Gate Fet's.

DESCRIPTIVE NOTE: Final rept.,

JUL 85 48P

PERSONAL AUTHORS: Spencer, M. G.; Harris, G. L.

CONTRACT NO. AFOSR-84-0201

MONITOR: AFOSR, XF
TR-90-0788, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary research objective of this project was to investigate the possibilities of improved performance in the 'standard' GaAs field effect transistor structures. A secondary objective was to determine the extent to which Deep UV Lithography could be used as a technique to produce high resolution geometries. At this point in time we have succeed in the second endeavor and can now routinely produce 0.5 micron gate geometries with Deep UV lithography and occasionally we have produced sub 0.25 micron structures. Using this technology we have produced devices with 'state of the art', electrical characteristics. Toward the end of this reporting period and into the last term of the contract we are investigating a novel structure to try and increase the output conductance of our devices. As an aside we have investigated the annealing of undoped epitaxial material and have obtained some interesting results which are the subject of our first Phd. thesis. (rh)

DESCRIPTORS: (U) *ELECTRICAL PROPERTIES, ANNEALING, CONDUCTIVITY, EPITAXIAL GROWTH, GATES(CIRCUITS), HIGH RESOLUTION, LITHOGRAPHY, MATERIALS, OUTPUT, SHORT RANGE(TIME), ULTRAVIOLET RADIATION.

AD-A225 502 5/8

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Competitive Learning: From Interactive Activation to Adaptive Resonance.

DESCRIPTIVE NOTE: Interim rept.,

87 24P

PERSONAL AUTHORS: Grossberg, Stephen

CONTRACT NO. F49620-86-C-0037, $AFOSR-85-0149

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF
TR-88-0372, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Functional and mechanistic comparisons are made between several networks models of cognitive processing: competitive learning, Interactive activation, adaptive resonance, and back propagation. The starting point of this comparison is the article of Rumelhart and Zipser (1985) on feature discovery through competitive learning. All the models which Rumelhart and Zisper (1985) have described were shown in Grossberg (1976b) to exhibit a type of learning which is temporally unstable. Competitive learning mechanisms can be stabilized in response to an arbitrary input environment by being supplemented with mechanisms for learning top-down expectancies, or templates; for matching bottom-up input patterns with the top-down expectancies; and for releasing orienting reactions in a mismatch situation, thereby updating short-term memory and searching for another internal representation. Network architectures which embody all of these mechanisms were called adaptive resonance models by Grossberg (1976c). (JES)

DESCRIPTORS: (U) *LEARNING, *MEMORY(PSYCHOLOGY), ACTIVATION, ADAPTIVE SYSTEMS, ARCHITECTURE, COGNITION, COMPETITION, ENVIRONMENTS, INPUT, INTERACTIONS, INTERNAL, MODELS, NETWORKS, ORIENTATION(DIRECTION), PROCESSING, PROPAGATION, RESONANCE, SHORT RANGE(TIME), TEMPLATES.

AD-A225 502 CONTINUED

IDENTIFIERS: (U) WUAFOSR2313A5, PE61102F.

AD-A225 481 11/6.1 6/1

GEORGIA UNIV ATHENS

(U) Symposium on Metals in Biochemistry and Materials Science.

DESCRIPTIVE NOTE: Final conference rept. 1 Sep 88-31 Aug 89,

JUN 89 11P

PERSONAL AUTHORS: King, R. B.

CONTRACT NO. AFOSR-88-0255

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-89-0820, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The 1989 Biennial Inorganic Symposium with the theme Inorganic Compounds with Unusual Properties. III. Electron Transfer in Biology and the Solid State was held at the University of Georgia in Athens, Georgia, during the period March 1-4, 1989. The symposium stimulated interactions between scientists studying mechanisms of electron transfer between metal centers in solid state materials and those studying the same process in metalloproteins. The program consisted of 17 invited talks, 10 contributed oral presentations, and 21 poster presentations. A book containing papers for 23 of the 27 oral presentations is being published by the American Chemical Society as an Advances in Chemistry Series volume. Lists of the symposium participants and titles of both the oral presentations and posters presentations are appended to this report. Superconductivity, Metalloenzymers, Electron transfer. (KR)

DESCRIPTORS: (U) *BIOCHEMISTRY, *MATERIALS, *METALS, BIOLOGY, CHEMICALS, CHEMISTRY, ELECTRON TRANSFER, GEORGIA, INORGANIC COMPOUNDS, INORGANIC MATERIALS, INTERACTIONS, SOLIDS, STIMULATION(GENERAL), SUPERCONDUCTIVITY, SYMPOSIA, UNIVERSITIES, VOLUME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A225 481

AD-A225 480 12/5 6/4

ILLINOIS UNIV CHAMPAIGN

(U) Software Modules for Stereo, Texture and Perceptual Grouping in Early Vision.

DESCRIPTIVE NOTE: Final rept. 15 May 88-14 Mar 89,

MAR 89 2P

PERSONAL AUTHORS: Ahuja, Narendra

CONTRACT NO. AFOSR-88-0220

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR, XF
TR-89-0804, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this project was to develop fast algorithms for performing the computations required by the various early vision modules that we have been developing. The early vision modulus require intensive computation and are a major problem in system development since they consume a distractingly large amount of real time during the development process. The goal of the work therefore was high computational efficiency, to be accomplished both by improving the basic efficiency of the algorithms as well as multiprocessing, so that the development of larger systems that use the early vision modulus as components would not be adversely affected by slow response times of the modules. (Author) (KR)

DESCRIPTORS: (U) *COMPUTER PROGRAMS, *VISION, *MODULES(ELECTRONICS), ALGORITHMS, COMPUTATIONS, EFFICIENCY, HIGH RATE, MODULAR CONSTRUCTION, MULTIPROCESSORS, PERCEPTION, REAL TIME, RESPONSE, TEXTURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2.

AD-A225 480

AD-A225 358 21/4

PURDUE UNIV LAFAYETTE IN DEPT OF MEDICINAL CHEMISTRY AND PHARMACOGNOSY

(U) A Toluene Model for Hydrocarbon Risk Assessment.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 89,

MAY 90 8P

PERSONAL AUTHORS: Morre, James

CONTRACT NO. AFOSR-89-0219

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-90-0811

UNCLASSIFIED REPORT

ABSTRACT: (U) This project was for continuation of research to investigate the molecular mode of action of a membrane-active hydrocarbon, toluene, potentially present in the Air Force environment as a flight fuel component or from other sources and to serve as a model for other membrane-active molecules in the environment. Two important target sites were identified where rapid dose-dependent but reversible changes in the membrane organization occurred at low dose levels. One of these was at the plasma membrane where the ability of the membrane to form protuberances was severely compromised. The other concerned a failure to form protuberances by membranes involved in internal trafficking between the endoplasmic reticulum and the Golgi apparatus. This step was reproduced in a cell-free system making detailed studies possible. The toluene inhibited step was identified as dependent on ATP hydrolysis. The involved ATPase activity was characterized, solubilized and partially purified. (jes)

DESCRIPTORS: (U) *FUELS, AIR FORCE, DOSAGE, ENVIRONMENTS, FLIGHT, HYDROCARBONS, HYDROLYSIS, LEVEL(QUANTITY), LOW LEVEL, MEMBRANES, MODELS, MOLECULES, ORGANIZATIONS, PLASMAS(PHYSICS), PROTUBERANCES, REVERSIBLE, RISK, SITES, TARGETS, TOLUENES.

AD-A225 358 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

AD-A225 358

AD-A225 357 6/4 5/6

EYE RESEARCH INST OF RETINA FOUNDATION BOSTON MA

(U) Eye Movements and Spatial Pattern Vision.

DESCRIPTIVE NOTE: Annual rept. 1 May 89-30 Apr 90,

JUL 90 13P

PERSONAL AUTHORS: Arend, Lawrence E.

CONTRACT NO. AFOSR-89-0377

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-90-0810

UNCLASSIFIED REPORT

ABSTRACT: (U) Models of human lightness and color perception must take account of color constancy, a tendency for apparent surface color to be relatively independent of the color and intensity of the illuminating light source. Our observers matched the lightness (apparent reflectances) and brightnesses (apparent luminances) of regions in simple and complex achromatic spatial patterns. The data showed that the observers' knowledge of the surface reflectances was unaffected by brightness changes due to varying illuminance. A third perceptual dimension, local brightness contrast, was different from both lightness and brightness. In further experiments we found that moving a patch from a black background to a white background could produce an error of apparent surface color of about 1.5 Munsell Value steps. Similar experiments at mesopic mean luminances revealed that the brightness contrast produced by a fixed luminance contrast declines with mean luminance. Keywords: Visual illusions; Color constancy; Color vision. (edc)

DESCRIPTORS: (U) *COLOR VISION, *EYE MOVEMENTS, *LUMINANCE, BACKGROUND, BLACK(COLOR), BRIGHTNESS, COLORS, CONTRAST, HUMANS, ILLUMINATION, ILLUSIONS, LIGHT SOURCES, MEAN, MODELS, PATTERNS, VISUAL PERCEPTION, REFLECTANCE, SPATIAL DISTRIBUTION, SURFACES, VISION.

AD-A225 357 CONTINUED

IDENTIFIERS: (U) Visual illusions, Color constancy.

AD-A225 358 6/5

OREGON STATE UNIV CORVALLIS

(U) Pharmacokinetics of Lipophilic Agents Following Preexposure: Non-Cytochrome P-450 Mediated Mechanisms.

DESCRIPTIVE NOTE: Final rept. 1 Mar 87-28 Feb 90,

MAY 90 21P

PERSONAL AUTHORS: Carpenter, Hillary M.; Curtis, Lawrence R.

CONTRACT NO. AFOSR-87-0185

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-90-0812

UNCLASSIFIED REPORT

ABSTRACT: (U) Low levels of lipophilic organochlorine compounds (OCs) are present in the environment. Despite the fact that there is no question regarding the toxicity of many of these compounds on an acute high dose basis, the chronic effects of low levels of these materials has not been adequately examined. Since the chemical properties of these materials make them incompatible with water, the cell must use specialized means for handling them. These include xenobiotic metabolizing enzymes, cytosolic binding proteins and lipid storage depots. The studies performed during the period of this grant were an attempt to characterize a pretreatment disposition response (PDR) system which is a portion of the cellular response to low levels of OCs. It is apparent from our studies that PDR is not due to changes in the total lipid content of cells but may be due to an alteration in cytosolic binding proteins. (jes)

DESCRIPTORS: (U) *MEDICINE, CELLS, CHEMICAL PROPERTIES, DOSAGE, ENZYMES, LIPIDS, LOW LEVEL, PHARMACOKINETICS, RESPONSE, STORAGE, SUPPLY DEPOTS, TOXICITY, WATER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

AD-A225 100 14/2

MICHIGAN UNIV ANN ARBOR

(U) Multipurpose 2000 deg C Furnace for Physical Testing in Controlled Atmosphere.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Oct 89,

FEB 90 2P

PERSONAL AUTHORS: Chen, I-Wei

REPORT NO. UMSC-89-C-AF-1

CONTRACT NO. AFOSR89-0127

PROJECT NO. 3842

TASK NO. A3

MONITOR: AFOSR TR-90-0831

UNCLASSIFIED REPORT

ABSTRACT: (U) A high temperature (2000 C) furnace and a servohydraulic test frame were purchased and installed for physical testing in controlled atmospheres of structural ceramics made superplastic by advanced ceramic processing. Keywords: Furnace, High temperature, Testing and evaluation, Physical properties, Ceramic materials. (jes)

DESCRIPTORS: (U) *TEST AND EVALUATION, CERAMIC MATERIALS, CONTROLLED ATMOSPHERES, FURNACES, HIGH TEMPERATURE, PHYSICAL PROPERTIES, PROCESSING, STRUCTURAL PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR3842A3.

AD-A225 098 20/7

MARYLAND UNIV COLLEGE PARK DEPT OF ELECTRICAL ENGINEERING

(U) Investigation of the Propagation of Intense Charged Particle Beams into Vacuum.

DESCRIPTIVE NOTE: Final rept. 1 May 87-30 Apr 90,

JUL 90 128P

PERSONAL AUTHORS: Destler, William W.

CONTRACT NO. AFOSR-84-0091

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-90-0840

UNCLASSIFIED REPORT

ABSTRACT: (U) Laser-controlled beamfront accelerator experiments achieved gradients of up to 40 MV/m and proton acceleration to 18 MeV over 40 cm with a beam energy of 900 keV. Beamfront electric field degradiation requirements beam energy to be increased as the gradient is increased. An experiment with a beam energy of 1.5 MeV achieved a 60 MV/m gradient in a 100 cm distance, matching theoretical models. Experiments with psuedospark discharges achieved electron beams of 25 kV, 1000 A/sq. cm., 10 ns with 10(11) A/(m-rad)sq brightness. Theory indicates densities greater than 10(3) A/sq. cm. and brightness greater than 10(11) A/(m-rad)sq are achievable. Keywords: Charge neutral; Current neutral charged particle beams; Plasmoids. (jhd)

DESCRIPTORS: (U) *ELECTRON ACCELERATORS, *LASER BEAMS, *ENERGY TRANSFER, ACCELERATION, CHARGED PARTICLES, ELECTRON BEAMS, ENERGY, GRADIENTS, INTENSITY, MATCHING, MODELS, PARTICLE BEAMS, PROTONS, REQUIREMENTS, THEORY, VACUUM.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7, Plasmoids.

AD-A225 042 11/6

CALIFORNIA UNIV BERKELEY DEPT OF MATERIALS SCIENCE AND MINERAL ENGINEERING

(U) Modeling of Micromechanisms of Fatigue and Fracture in Hybrid Materials.

DESCRIPTIVE NOTE: Final rept. 15 Apr 87-14 Apr 90,

JUN 90 91P

PERSONAL AUTHORS: Edelson, L. H.; Shang, J. -K.; Siu, S. C.; Venkateswara Rao, K. T.; Ritchie, R. O.

REPORT NO. UCB/R/90/A1065

CONTRACT NO. AFOSR-87-0158

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-90-0832

UNCLASSIFIED REPORT

ABSTRACT: (U) The obvious benefits of the design of aerospace structures using lighter materials with high specific strengths and stiffnesses had led to the development of numerous reinforced composite metallic and intermetallic materials, which have become serious commercial competitors to traditional monolithic metallic alloys. While significant advances in processing technology have made the fabrication of such hybrid materials more of an economic reality, their widespread use in airframes or other structures has been limited by serious deficiencies in mechanical properties, particularly ductility, toughness and fatigue. This problem is compounded by the lack of fundamental studies which provide a rational basis for the underlying sources of crack-propagation resistance, and in particular which define the critical role of composite microstructure. Keywords: Fatigue; Fracture toughness; Subcritical crack growth; Metal-matrix composites; Laminates; Fatigue cracks; Crack closure; Crack bridging; Aluminum alloys; Titanium alloys. (JES)

DESCRIPTORS: (U) *HYBRID SYSTEMS, *METAL MATRIX

AD-A225 042 CONTINUED

COMPOSITES, AEROSPACE CRAFT, AIRFRAMES, ALUMINUM ALLOYS, BRIDGES, CLOSURES, COMPOSITE MATERIALS, CRACK PROPAGATION, CRACKS, DUCTILITY, FATIGUE(MECHANICS), FRACTURE(MECHANICS), LAMINATES, MATERIALS, MATRIX MATERIALS, MECHANICAL PROPERTIES, MICROSTRUCTURE, PROCESSING, RESISTANCE, SOURCES, STRENGTH(GENERAL), SUBCRITICAL ASSEMBLIES, TITANIUM ALLOYS, TOUGHNESS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

AD-A225 018 7/3

CORNELL UNIV ITHACA NY DEPT OF CHEMISTRY

(U) Carbon Monoxide Cleavage by (Silox)3Ta (Silox = (t) Bu3SiO(-)): Physical, Theoretical, and Mechanistic Investigations,

89 19P

PERSONAL AUTHORS: Neithamer, David R.; LaPointe, Robert E.; Wheeler, Ralph A.; Richeson, Darrin S.; Van Duyne, Gregory D.

CONTRACT NO. AFOSR-87-0103

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-90-0682

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in the Jnl. of the American Chemical Society, v111 n25 p9056-9072 1989.

ABSTRACT: (U) The Fischer-Tropsch (F-T) reaction, the conversion of synthesis gas (CO/H2) to hydrocarbons and oxygenates, has commanded the attention of the organometallic community for the past 10-15 years. During periods when olefin feedstocks are costly, the production of low molecular weight commodity chemical from coal or natural gas via this method becomes economically attractive. The heterogeneously catalyzed F-T process is inherently nonselective since it produces a Shulz-Flory distribution of hydrocarbons, oxygenates, or both; thus homogeneous systems, considered to possess the advantage of greater selectivity have attracted substantial interest. While a commercially feasible homogeneous F-T process has yet to be developed, some of the desired selectivity, especially toward methanol and C2 oxygenates, has been demonstrated. In addition, organometallic chemistry, through investigations of stoichiometric transformations involving carbon monoxide and dihydrogen, has dramatically increased our fundamental understanding fo plausible individual steps that pertain to the F-T reaction. (JES)

AD-A225 018 CONTINUED

DESCRIPTORS: (U) *CARBON MONOXIDE, CHEMISTRY, CLEAVAGE, COAL, COMMODITIES, COMMUNITIES, CONVERSION, GASES, HOMOGENEITY, HYDROCARBONS, LIGHTWEIGHT, METHANOLS, MOLECULAR WEIGHT, NATURAL GAS, ORGANOMETALLIC COMPOUNDS, PRODUCTION, STOICHIOMETRY, SYNTHESIS, TRANSFORMATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A225 006 6/5

CALIFORNIA UNIV LOS ANGELES MENTAL RETARDATION RESEARCH CENTER

(U) Electrical Interactions between Mammalian Cortical Neutons.

DESCRIPTIVE NOTE: Final rept. 15 Aug 88-14 Feb 90,

MAY 90 69P

PERSONAL AUTHORS: Dudek, F. E.

CONTRACT NO. AFOSR-87-0361

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-90-0730

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Includes nine attachments.

ABSTRACT: (U) The purpose of our research has been to delineate mechanisms of neuronal communication in the mammalian brain. We have studied rapid mechanisms of communication, including electrical transmission and chemical synapses, with an emphasis on local interactions among cortical and hypothalamic neurons. In the hippocampus, we are completing our studies concerning the effects of altered osmolality of the extracellular fluid on synchronous bursting of population spikes in low-Ca2+ solutions (chemical synapses blocked). Electrophysiological studies on hypothalamic neurons have primarily evaluated the role of excitatory amino acids in fast synaptic transmission in the supraoptic, paraventricular and suprachiasmatic nuclei. Intracellular recordings have allowed direct analyses of EPSPs, and single-electrode voltage-clamp experiments have permitted analyses of synaptic currents. These experiments have provided direct evidence that glutamate is the primary fast excitatory transmitter throughout the hypothalamus. Keywords: Electrical interactions, Hippocampus, Hypothalamus suprachiasmatic nucleus, Excitatory amino acids. (JES)

AD-A225 006 CONTINUED

DESCRIPTORS: (U) *BRAIN, *ELECTROPHYSIOLOGY, AMINO ACIDS, CELLS(BIOLOGY), CHEMICALS, COMMUNICATION AND RADIO SYSTEMS, CURRENTS, ELECTRIC POWER TRANSMISSION, ELECTRICAL PROPERTIES, FLUIDS, GLUTAMIC ACID, HIPPOCAMPUS, HYPOTHALAMUS, INTERACTIONS, MAMMALS, NERVE CELLS, NUCLEI, OSMOSIS, POPULATION, RECORDING SYSTEMS, SALTS, SPIKES, SYNAPSE, TRANSMITTANCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

AD-A224 997 20/5

OREGON UNIV EUGENE

(U) Energetic X-ray Processes in Atoms.

DESCRIPTIVE NOTE: Final technical rept. 15 Jan 87-30 Jun 90,

JUL , 90 9P

PERSONAL AUTHORS: Crasemann, Bernd

CONTRACT NO. AFOSR-87-0026

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-90-0835

UNCLASSIFIED REPORT

ABSTRACT: (U) Properties of highly stripped ions have been computed relativistically in intermediate coupling with configuration interaction, including quantum electrodynamic effects. Charged-particle ionization cross sections have been calculated, including effect of autoionizing resonances on electron-impact excitation rates. Dielectronic recombination rates have been calculated. An extensive computation of relativistic Auger radial matrix elements has been performed; the results can be used to calculate radiationless transition rates in multiply ionized atoms and are expected to be very useful for the computation of Auger rates in molecules. Keywords: Atomic physics, Atomic inner shell processes. (jhd)

DESCRIPTORS: (U) *ATOMIC PROPERTIES, *ENERGETIC PROPERTIES, *QUANTUM THEORY, *X RAYS, ATOMS, CHARGED PARTICLES, AUGER ELECTRON SPECTROSCOPY, COMPUTATIONS, CONFIGURATIONS, COUPLING(INTERACTION), CROSS SECTIONS, ELECTRODYNAMICS, ELECTRONS, EXCITATION, IMPACT, INTERACTIONS, INTERNAL, IONIZATION, MOLECULES, NUCLEAR PHYSICS, RADIATION, RESONANCE, SHELLS(STRUCTURAL FORMS), TRANSITIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4.

AD-A224 985 11/4

BERKELEY APPLIED SCIENCE AND ENGINEERING CA

(U) Development of an Advanced Continuum Theory for Composite Laminates. Phase 1.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-30 Jun 90,

JUN 90 259P

PERSONAL AUTHORS: Ghanimati, G. R.; Panahandeh, M.; Bozorgnia, Y.

REPORT NO. RG-03-89

CONTRACT NO. F49620-90-C-0001

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-90-0781

UNCLASSIFIED REPORT

ABSTRACT: (U) A continuum theory for laminated composite materials, referred to as 'Cosserat Composite Theory', was developed. The theory was represented by a set of well defined conservation laws that within the context of purely mechanical theory exhibits the following features: (i) it accounts for the effect of microstructures, (ii) it accounts for the effect of geometric nonlinearity, (iii) it accounts for the interlaminar stresses and therefore delamination can be considered, (iv) it is cable of incorporating the effect of material nonlinearity, (v) it accounts for the effect of curvature, (vi) it possesses a continuum character, and finally (vii) it is applicable to both static and dynamic problems. The composite laminate was modeled as a series of Cosserat surfaces which were considered as microstructures. Various quantities associated with the microstructure were defined and the corresponding quantities for composite laminates were derived. The nonlinear constitutive equations for an elastic composite laminate were presented. (JES)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *LAMINATES, CONSERVATION, DYNAMICS, ELASTIC PROPERTIES, EQUATIONS,

AD-A224 985 CONTINUED

GEOMETRY, MATERIALS, MECHANICAL PROPERTIES, MICROSTRUCTURE, NONLINEAR SYSTEMS, STRESSES, THEORY.

AD-A224 981 6/11

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF BIOCHEMICAL PHARMACOLOGY

(U) Acetylcholinesterase Chirality and Cellular Mechanisms of Organophosphonate Toxicity.

DESCRIPTIVE NOTE: Final rept. 1 Jun 85-31 Mar 90,

JUN 90 36P

PERSONAL AUTHORS: Berman, Harvey A.

CONTRACT NO. DAAG29-85-K-0083

MONITOR: AFOSR
22583.15-LS

UNCLASSIFIED REPORT

ABSTRACT: (U) These studies concern the chiral reactivity of AchE, and examine the topography of the enzyme subunit. Several independent kinetic and equilibrium indices of ligand orientation are employed: bimolecular inhibition, oxime reactivation, aging, and equilibrium dissociation constants. Organic synthesis is an integral part of these studies and we developed several families of achiral and chiral, and fluorescent and non-fluorescent organophosphonates and reversible noncovalent fluorescent probes. These agents are employed in study of AchE from Torpedo, as one means for probing subunit topography, as well as in in vivo and in vitro studies concerning cellular regulation of AchE. Keywords: Acetylcholinesterase; Organophosphates; Organophosphonates; Chirality; Cellular toxicity. (jes)

DESCRIPTORS: (U) *ACETYLCHOLINESTERASE, *ORGANOPHOSPHATES, *TOXICITY, ACTIVATION, CELLS, CONSTANTS, CONTROL, CYTOLOGY, DISSOCIATION, ENZYMES, EQUILIBRIUM(GENERAL), FLUORESCENCE, IN VITRO ANALYSIS, IN VIVO ANALYSIS, INDEXES, INHIBITION, KINETICS, MOLECULES, ORGANIC MATERIALS, ORGANIC PHOSPHORUS COMPOUNDS, OXIMES, PHOSPHONATES, PROBES, REACTIVITIES, SYNTHESIS, TOPOGRAPHY.

AD-A224 905 20/7

IOWA STATE UNIV AMES

(U) DoD-URIP Thin Film Deposition Equipment. Phase 2.

DESCRIPTIVE NOTE: Final rept.,

84 6P

PERSONAL AUTHORS: Lakin, K. M.; Shanks, H. S.

CONTRACT NO. AFOSR-84-0370

MONITOR: AFOSR
TR-90-0796

UNCLASSIFIED REPORT

ABSTRACT: (U) A triple source ionized cluster beam deposition system was purchased and installed as part of a thin film research facility. A scanning auger system was added with university matching funds. Keywords: Thin film storage devices, Ion beams. (cp)

DESCRIPTORS: (U) *ION BEAMS, *THIN FILM STORAGE DEVICES, AUGER ELECTRON SPECTROSCOPY, AUGER ELECTRONS, ELECTRONIC SCANNERS, RESEARCH FACILITIES, SCANNERS, THIN FILMS.

IDENTIFIERS: (U) Ionized cluster beam.

AD-A224 904 20/5 20/8

NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIV GREENSBORO DEPT OF ELECT RICAL ENGINEERING

(U) An X-Ray Diffraction System for Evaluating the Epitaxial Growth of III-V Alloy Semiconductors.

DESCRIPTIVE NOTE: Final technical rept.,

SEP 84 4P

PERSONAL AUTHORS: Collis, W. J.

CONTRACT NO. AFOSR-83-0232

MONITOR: AFOSR TR-90-0798

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose ot this grant was the acquisition of an X-ray diffractometer system for use in evaluating the heteroepitaxial growth of III-V semiconductor compounds and alloys. The diffraction data permit a determination of the lattice constant mismatch between the single crystal substrate and the epilayer. Keywords: Semiconductors, X-Ray diffraction, Epitaxial growth. (cp)

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *SEMICONDUCTORS, *X RAY DIFFRACTION, ACQUISITION, ALLOYS, CRYSTAL LATTICES, DIFFRACTOMETERS, GROUP III COMPOUNDS, GROUP V COMPOUNDS, SINGLE CRYSTALS, SUBSTRATES.

IDENTIFIERS: (U) III-V Alloy semiconductors.

AD-A224 902 11/2

CASE WESTERN RESERVE UNIV CLEVELAND OH DEPT OF METALLURGY

(U) HREM of Incoherent ZrO2/Al2O3 Interfaces,

85 4P

PERSONAL AUTHORS: Heuer, A. H.; Kraus-Lanteri, S. P.; Labun, P. A.; Mitchell, T. E.

MONITOR: AFOSR TR-90-0833

UNCLASSIFIED REPORT

Availability: Pub. in Inst. Phys. Conf. Ser no. 78, Chapter 13, p519-522 1985. No copies furnished by DTIC/NTIS.

ABSTRACT: (U) Dispersion-toughened ceramics have received much attention in recent years due to their impressive mechanical properties. In particular, ZrO2 additions to Al2O3 can increase the strength of the material to greater than 1 GPa. Typically, small amounts of ZrO2 (< or = 30 vol. %) are dispersed in a fine-grained Al2O3 matrix; the ZrO2 exists as both intragranular and intergranular, incoherent particles with either monoclinic (m) or tetragonal (t) symmetry. The enhanced strength and toughness arise from the phenomenon known as transformation toughening, involving the martensitic t-ZrO2 to m-ZrO2 transformation. Nucleation of the transformation invariably occurs at the ZrO2/Al2O3 interface. High resolution electron microscopy contributes vital information in helping to understand these interfaces. In the past, HREM has been performed on materials of known orientation containing coherent or semicoherent interfaces. In polycrystalline ZrO2-toughened Al2O3 (ZTA), the ZrO2/Al2O3 interface is not only incoherent but the particle and matrix are of random orientation. In spite of these adverse conditions, HREM is still possible, and yields interesting results. Reprints.

DESCRIPTORS: (U) *CERAMIC MATERIALS, ELECTRON MICROSCOPY, HIGH RESOLUTION, INCOHERENCE, MATERIALS, MECHANICAL PROPERTIES, NUCLEATION, ORIENTATION(DIRECTION), PARTICLES, REPRINTS, STRENGTH(GENERAL), TOUGHNESS.

AD-A224 901 11/2

CASE WESTERN RESERVE UNIV CLEVELAND OH DEPT OF METALLURGY

(U) HREM Studies of Interfaces in ZrO2/Al2O3 Ceramics,

85 2P

PERSONAL AUTHORS: Krays, S.

MONITOR: AFOSR
TR-90-0833

UNCLASSIFIED REPORT

Availability: Pub. in Proceedings of the Annual Meeting of the Electron Microscopy Society of America (43rd) p2180219 1985. No copies furnished by DTIC/NTIS.

ABSTRACT: (U) Because of its unusual mechanical and electrolytic properties, zirconia (ZrO2) finds a wide variety of uses, such as refractories, oxygen sensors, heaters and extrusion dies. ZrO2 exists in three polymorphic forms; the high temperature phase is cubic and is isostructural with CaF2 (fluorite); below 2350 C (in pure ZrO2), a tetragonally-distorted version of the fluorite structure exists. At still lower temperature, the tetragonal form (t-ZrO) transforms martensitically to a monoclinic structure (m-ZrO2). This t yields m transformation gives rise to the phenomenon of transformation toughening in ZrO2-containing ceramics, and thus provides ceramics with potential for high technology structural applications. Reprints. (jes)

DESCRIPTORS: (U) *CERAMIC MATERIALS, DETECTORS, DIES, EXTRUSION, HIGH TEMPERATURE, INTERFACES, LOW TEMPERATURE, OXYGEN, REFRACTORY MATERIALS, REPRINTS, STRUCTURAL PROPERTIES, TRANSFORMATIONS, YIELD, ZIRCONIUM OXIDES.

AD-A224 898 14/2 13/1

WRIGHT STATE UNIV DAYTON OH DEPT OF MECHANICAL SYSTEMS ENGINEERING

(U) Processing Science: Characterizing Flow Behavior of High Temperature Structural Materials.

DESCRIPTIVE NOTE: Final rept. 1 Jan 85-30 Apr 86,

JUN 86 8P

PERSONAL AUTHORS: Thomas, Joseph F., Jr

REPORT NO. WSU-84-124

CONTRACT NO. AFOSR-85-0078

MONITOR: AFOSR
TR-90-0821

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant provided for the purchase of a high temperature vacuum and controlled atmosphere furnace system. A Brew model 1052 was acquired, with a temperature capability of 1650 C. The furnace chamber has been mounted in the load frame of a servohydraulic mechanical tester with high load capacity and stroke rate capability. Together these comprise a unique test facility for determining the mechanical behavior and processing characteristics of high temperature structural materials. (JHD)

DESCRIPTORS: (U) *CONSTRUCTION MATERIALS, *HIGH TEMPERATURE, *VACUUM FURNANCES, CAPACITY(QUANTITY), CHAMBERS, CONTROLLED ATMOSPHERES, FLOW, FRAMES, FURNACES, LOADS(FORCES), MECHANICAL PROPERTIES, PROCESSING, RATES, TEST FACILITIES, SERVOMECHANICS.

IDENTIFIERS: (U) Model 1052 Brew Furnances.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A224 897 5/8 6/4

CALIFORNIA UNIV IRVINE DEPT OF PHARMACOLOGY

(U) Neuronal Mechanisms of Intelligence.

DESCRIPTIVE NOTE: Final rept.,

DEC 85 3P

PERSONAL AUTHORS: Stein, Larry

CONTRACT NO. AFOSR-83-0321

MONITOR: AFOSR
TR-90-0822

UNCLASSIFIED REPORT

ABSTRACT: (U) The equipment purchased on this grant is being used for on-line experimental control, data collection and data analysis on studies of the adaptive rules used by mammalian brain cells during conditioned behaviors. The research is based on the assumption that human intelligence has evolved from the goal-seeking brain functions of lower forms, and that these functions in turn depend on a capacity for behavior to be strengthened or rewarded by its consequences (positive reinforcement). We furthermore assume that positive reinforcement of the intact organism is physiologically mediated at the level of the single neuron, rather than at the level of the multi-neuronal assembly or network. (sdw)

DESCRIPTORS: (U) *INTELLIGENCE(HUMANS), ADAPTIVE SYSTEMS, BEHAVIOR, BRAIN, CELLS(BIOLOGY), CONTROL, DATA ACQUISITION, DATA PROCESSING, FUNCTIONS, MAMMALS, NERVE CELLS, ONLINE SYSTEMS.

AD-A224 897

AD-A224 896 12/6 12/5

TEXAS UNIV AT ARLINGTON DEPT OF COMPUTER SCIENCE

(U) Final Report for Grant AFOSR-83-0315 (Texas University)

DESCRIPTIVE NOTE: Final rept. 1 Aug 83-31 Jul 84,

DEC 85 7P

PERSONAL AUTHORS: Browne, J. C.

CONTRACT NO. AFOSR-83-0315

MONITOR: AFOSR
TR-90-0795

UNCLASSIFIED REPORT

ABSTRACT: (U) The funds provided by grant number AFOSR-83-0315 were combined with matching funds provided by the University of Texas to create a hardware and software development environment for parallel computer systems. The hardware development environment includes a chip and printed circuit board design and simulation capability and a high performance digital logic analyzer. The software development environment is a software-rich superminicomputer and a set of low-power graphics workstations. The total configuration includes a Digital Equipment Corporation VAX 11/750 computer system including the VMS operating system and a complement of other software, a Valid Logic computer-aided-design workstation including the Scald design system, a Tektronix DAS9129 high performance digital logic analyzer and a set of Apple Macintosh microcomputers to be used for terminals and as low-powered workstations. The fabrication of and the selections for the printed circuit boards for the four-processor nine-memory configuration of the Texas Reconfigurable Array Computer (TRAC) were also funded from this grant. There was one change between the equipment complement proposed and that actually purchased. The functions of the hardware documentation system specified in the proposal were subsumed in the capabilities of the Valid Logic design system purchased with matching funds from the University of Texas.

DESCRIPTORS: (U) *DIGITAL COMPUTERS, *COMPUTER PROGRAMS, *PARALLEL PROCESSING, DIGITAL SYSTEMS, LOGIC CIRCUITS, ARRAYS.

AD-A224 896

AD-A224 896 CONTINUED

IDENTIFIERS: (U) VAX-11/750 Computers, Operating systems.

AD-A224 873 6/1

HAHNEMANN MEDICAL COLL AND HOSPITAL PHILADELPHIA PA DEPT OF PHYSIOLOGY AND BI OPHYSICS

(U) The Role of Central Monoaminergic Systems in Arousal and Selective Attention.

DESCRIPTIVE NOTE: Annual technical rept. 1 Apr 89-31 Mar 90,

JUN 90 10P

PERSONAL AUTHORS: Waterhouse, Barry D.

CONTRACT NO. AFOSR-87-0138

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-90-0752

UNCLASSIFIED REPORT

ABSTRACT: (U) The work described here is part of an ongoing set of studies aimed at characterizing the physiological actions and anatomical organization of the monoaminergic projection systems to the rat cerebral cortex. The underlying theme of this work is that the endogenous monoamines, norepinephrine (NE) and serotonin (5-HT), serve to modulate central neuronal responsiveness to afferent synaptic inputs and by so doing participate in the cognitive process of selective attention. Individual studies conducted during the past year have investigated: (1) the adrenergic and amino acid receptor specificity of NE-induced facilitation of glutamate efficacy, (2) the influence of NE on GABA-induced membrane conductance changes in identified cortical neurons, (3) the effects of NE on the receptive field properties of visual cortical neurons and (4) the anatomical distribution of monoamine-containing cells that project via axon collaterals to multiple sites along the central somatosensory pathway. Overall, the data provide further support for the contention that the diffusely distributed monoamine systems of the mammalian brain may enhance the performance of target neuronal circuits as a function of changing behavioral conditions. (jes)

AD-A224 896

AD-A224 873

AD-A224 873 CONTINUED

DESCRIPTORS: (U) *COGNITION, *SEROTONIN, ANATOMY, BEHAVIOR, BRAIN, CEREBRAL CORTEX, CIRCUITS, DISTRIBUTION, GLUTAMIC ACID, MAMMALS, NERVE CELLS, NOREPINEPHRINE, ORGANIZATIONS, PHYSIOLOGY, RATS, RESPONSE, SALTS, SITES, TARGETS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

AD-A224 851 13/1

MICHIGAN UNIV ANN ARBOR

(U) Multipurpose 2000 deg C Furnace for Physical Testing in Controlled Atmosphere.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Oct 89,

FEB 90 2P

PERSONAL AUTHORS: Chen, I-Wei

REPORT NO. USMC-89-C-AF-1

CONTRACT NO. AFOSR-89-0127

PROJECT NO. 3842

TASK NO. A3

MONITOR: AFOSR TR-90-0831

UNCLASSIFIED REPORT

ABSTRACT: (U) A high temperature (2000 C) furnace and a servohydraulic test frame were purchased and installed for physical testing in controlled atmospheres of structural ceramics made superplastic by advanced ceramic processing. (EDC)

DESCRIPTORS: (U) *FURNACES, CERAMIC MATERIALS, CONTROLLED ATMOSPHERES, HIGH TEMPERATURE, HYDRAULIC SERVOMECHANISMS, MULTIPURPOSE, PHYSICAL PROPERTIES, PLASTIC PROPERTIES, TEST AND EVALUATION.

IDENTIFIERS: (U) Superplasticity, Structural ceramics, PE61102F, WUAFOSR3842A3.

AD-A224 845 5/2 12/9

OREGON UNIV EUGENE DEPT OF PSYCHOLOGY

(U) Explorations of Anatomy of Connectionist Models for Visual Lexical Access.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-30 Apr 90,

JUN 90 25P

PERSONAL AUTHORS: Posner, Michael I.; Tucker, Don M.

CONTRACT NO. AFOSR-89-0050

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-90-0729

UNCLASSIFIED REPORT

ABSTRACT: (U) During this 18 month short term initiative grant we have developed a new state of the art ERP laboratory based on Macintosh computers and labview software that can record up to 64 channels of EEG input. In this report we describe this system, its potential and include a manual for its operation. In addition, we have completed two experiments that show a distinction between words and consonant strings that is maximal for occipital lobe electrodes and that occurs within the first 250 millisec after input. In addition, words also differ from consonant strings in the lateral distribution of electrical activity over posterior temporal leads within the first 200 millisec following input. These two results conform to findings using PET suggesting an area sensitive to orthographic regularity in the left ventral occipital lobe (Snyder et al, 1989). Keywords: Attention, Event related potentials, Parallel distribution processes, Work recognition. (JES)

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, ACCESS, ANATOMY, COMPUTER PROGRAMS, COMPUTERS, DISTRIBUTION, ELECTRICAL PROPERTIES, ELECTROENCEPHALOGRAPHY, INPUT, LEXICOGRAPHY, PARALLEL PROCESSING, RECOGNITION, VISION, ATTENTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4, ERP(Event

AD-A224 845 CONTINUED

Related Potentials).

AD-A224 806 11/10

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) The Materials Science and Engineering of Rigid-Rod Polymers.

DESCRIPTIVE NOTE: Final rept.,

JUN 90 724P

PERSONAL AUTHORS: Adams, W. W.; Eby, Ronald K.; McLemore, Donald M.

CONTRACT NO. AFOSR-89-0039

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-90-0839

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Symposium Proceedings of the Materials Research Society, v134, Boston, MA, November 28-December 2, 1988.

ABSTRACT: (U) The Symposium on The Materials Science and Engineering of Rigid-Rod Polymers was held from November 28 to December 2, 1988, in Boston Massachusetts, as Symposium J of the 1988 Fall Meeting of the Materials Research Society. It provided the first international forum for a comprehensive, multidisciplinary discussion of the science and engineering of rigid-rod polymers and molecular composites. These new materials represent an outstanding scientific development and have considerable potential for technological applications ranging from structural to electronic and nonlinear optical. (JES)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *ELASTOMERS, INTERNATIONAL, MASSACHUSETTS, MATERIALS, MOLECULES, SOCIETIES, SYMPOSIA.

AD-A224 796 12/2

WISCONSIN UNIV-MADISON DEPT OF MATHEMATICS

(U) Preconditioning and Boundary Conditions,

JUN 90 40P

PERSONAL AUTHORS: Manteuffel, Thomas A.; Parter, Seymour V.

CONTRACT NO. AFOSR-86-0163

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-90-0806

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. on Numerical Analysis, v27 n3 p656-694 Jun 90.

ABSTRACT: (U) Consider the large systems of linear equations A sub h u sub h = f sub h that arise from the discretization of a second-order elliptic boundary-value problem. Consider also the preconditioned systems (i) (1/B sub h) A sub h u sub h = (1/B sub h) f sub h and (ii) A sub h (1/B sub h) v sub h = f sub h, u sub h = (1/B sub h), where (1/B sub h) is itself a matrix that arises from the discretization of another elliptic operator. The effect of boundary conditions (of A and B) on the L2 and H1 condition of (1/B sub h), A sub h, A sub h, (1/B sub h) is discussed. In particular, in the case of H2 regularity, it is found that Abs val (1/B sub h)(A sub h) sub L2 is uniformly bounded if and only if A* and B* have the same boundary conditions, whereas Abs val (A sub h)(1/B sub h) sub L2 is uniformly bounded if and only if A and B have the same boundary conditions. Similarly, Abs val (1/B sub h)(A sub h) sub H1 is uniformly bounded if and only if A and B have homogeneous Dirichlet boundary conditions on the same portion of the boundary. This latter result does not depend on H2 regularity. Reprints. (jhd)

DESCRIPTORS: (U) *BOUNDARY VALUE PROBLEMS, BOUNDARIES, DIRICHLET INTEGRAL, ELLIPSES, HOMOGENEITY, LINEAR DIFFERENTIAL EQUATIONS, OPERATORS(PERSONNEL), REPRINTS.

AD-A224 796 CONTINUED

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F, Elliptic differential equations.

AD-A224 790 21/2

SOUTHAMPTON UNIV (UNITED KINGDOM) DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Transport in Dump Combustors.

DESCRIPTIVE NOTE: Rept. for 1 Jun 83-30 Nov 84,

AUG 86 9P

PERSONAL AUTHORS: Bray, C.

CONTRACT NO. AFOSR-83-0170

MONITOR: AFOSR
TR-90-0823

UNCLASSIFIED REPORT

ABSTRACT: (U) A new theoretical description of mean chemical reaction rates in premixed turbulent combustion is devised. The mean rate is described as the product of the number of flamelet crossings per unit time and the average chemical production per crossing. Chemical mechanisms of arbitrary complexity can be accommodated. A generalized description of turbulent transport is proposed for use in combuster flow field calculations. The experimental programme was not successful because of illness and staff changes. (jes)

DESCRIPTORS: (U) *COMBUSTION, *REACTION KINETICS, FLAME PROPAGATION, TURBULENCE, TRANSPORT PROPERTIES, MATHEMATICAL PREDICTION, COMBUSTORS, RATES, FLOW FIELDS, THEORY, GREAT BRITAIN.

IDENTIFIERS: (U) Turbulent combustion.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A224 782 14/2

CALIFORNIA UNIV BERKELEY SPACE SCIENCES LAB

(U) Cosmic Background Radiation Study Sunyaev-Zel'dovich Effect and Small Angular Scale Anisotropy.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 85-31 Jan 86,

MAR 86 2P

PERSONAL AUTHORS: Smoot, George F.

CONTRACT NO. AFOSR-85-0162

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-90-0826

UNCLASSIFIED REPORT

ABSTRACT: (U) A bolometer cooled by a He-3 refrigerator has been built to detect small anisotropies in the cosmic background radiation. This bolometer can be tested on ground-based instruments and is proposed to be eventually used on a shuttle-borne system. Reprints. (jhd)

DESCRIPTORS: (U) *BACKGROUND RADIATION, BOLOMETERS, COSMIC RAYS, GROUND BASED, REPRINTS, SCALE, SPACE SHUTTLES, COSMIC RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2311A1, Sunyaev Zel Dovich Effect.

AD-A224 766 6/11

INDIANA UNIV AT BLOOMINGTON DEPT OF BIOLOGY

(U) Two-Dimensional Electrophoretic Analysis of Subcellular Liver Fractions and Isolated Hepatocytes from Normal and PFDA Treated Rats.

DESCRIPTIVE NOTE: Final rept. 15 Dec 88-14 Dec 89,

MAY 90 18P

PERSONAL AUTHORS: Witzmann, Frank A.

CONTRACT NO. AFOSR-89-0077

MONITOR: AFOSR
TR-90-0665

UNCLASSIFIED REPORT

ABSTRACT: (U) Perfluoro-n-decanoic acid (PFDA) effects on protein expression in the rat liver was studied following in vivo exposure to PFDA's LD50 and a lesser dose. Two-dimensional protein patterns were resolved on polyacrylamide gels for whole liver homogenate, mitochondrial, microsomal, cytosolic, and isolated hepatocyte protein fractions. PFDA exposure caused the deletion and induction of numerous proteins often in a dose related manner. Several proteins have been associated with those involved in lipid metabolism alterations characteristically induced by PFDA toxicity. Their actual identification awaits further study. The results of this project indicate that PFDA has significant effect on the quality and quantity of specific hepatocellular protein expression but whether these alterations are primary or secondary PFDA manifestations remains to be determined. (jes)

DESCRIPTORS: (U) *TOXICITY, CELLS(BIOLOGY), DOSAGE, ELECTROPHORESIS, EXPOSURE(GENERAL), GELS, IN VIVO ANALYSIS, ISOLATION, LIPID METABOLISM, LIVER, PATTERNS, POLYACRYLAMIDES, PROTEINS, RATS, TWO DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

AD-A224 763 20/12

UTAH UNIV SALT LAKE CITY DEPT OF PHYSICS

(U) High Frequency Behavior of Long and Small Junctions.

DESCRIPTIVE NOTE: Annual rept. 1 Dec 88-30 Nov 89,

JUN 90 26P

PERSONAL AUTHORS: Sympko, Orest G.

CONTRACT NO. AFOSR-89-0149

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR
TR-90-0830

UNCLASSIFIED REPORT

ABSTRACT: (U) Results are presented of studies on long Josephson junctions and on very small junctions. The long junctions are made out of NbN. Experiments were made on the lifetimes of fluxon states from 2 K to 0.01 K; they are of importance to a fundamental understanding of tunneling and nucleation. Multifluxon resonances were observed and they are of interest to the application of long junctions as high frequency oscillators. Very small junctions, all NbN, were fabricated using a STM approach. Results show the Coulomb blockade, the Coulomb staircase, and the staircase, and the superconducting energy gap. The two types of junctions are being combined to observe Bloch oscillations. (JHD)

DESCRIPTORS: (U) *HIGH FREQUENCY, *JOSEPHSON JUNCTIONS, ENERGY GAPS, NUCLEATION, OSCILLATION, OSCILLATORS, SUPERCONDUCTIVITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C3, STM(Scanning Tunneling Microscopes).

AD-A224 763

AD-A224 762 20/12

CITY COLL NEW YORK DEPT OF PHYSICS

(U) Ultrafast Physics in Microstructure and Alloy Systems.

DESCRIPTIVE NOTE: Final rept. 1 Dec 85-30 Nov 89,

JUN 90 13P

PERSONAL AUTHORS: Alfano, Robert

CONTRACT NO. AFOSR-86-0031

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-90-0828

UNCLASSIFIED REPORT

ABSTRACT: (U) This technical report summarizes the physics underlying ultrafast transient phenomena that occur in the semiconductor microstructures. (1) Nonequilibrium phonon effects on the energy relaxation and lifetime of photogenerated carriers in GaAs MQW; (2) Dependence of electron temperature on well width in AlInAs/GaInAs single quantum well; (3) Determination of band offsets in semiconductor heterolayer via optical transitions in ultrathin quantum wells; (4) Photogenerated of high-density electron-hole plasma energy relaxation and rapid expansion in CdSe; (5) Ultrafast photoluminescence kinetics from the magnetic semiconductor CdCrSe excited by femtosecond laser pulse; (6) Physics in semiconductor GaAs and GaSe under picosecond laser-driven shock-wave compression; (7) Optical transition and recombination lifetime in quasi-zero dimensional electron system in CdS(x)Se(1-x); (8) Picosecond dynamics of exciton dissociation by neutral carbon acceptors in GaAs quantum wells; (9) Determination of I-X mixing effects on the escape time of electrons in resonant state of GaAs/AlGaAs double-barrier tunneling structures; (10) Determination of intervalley X sub 6 - Gamma sub 6 scattering time in GaAs by picosecond pump-probe infrared absorption spectroscopy; (11) Determination of the effective mass and energy minimum of the X7 satellite conduction band of GaAs; (12) Gamma-L Intervalley scattering rates in GaAs measured by

AD-A224 762

AD-A224 762 CONTINUED

femtosecond time-resolved four-wave mixing spectroscopy; (13) Hole dynamics in GaAs epilayer grown on Si substrate; (14) Electron dynamics in GaAs multiple quantum wells on Si. (JHD)

DESCRIPTORS: (U) *MICROSTRUCTURE, *PHONONS, *PHOTOLUMINESCENCE, *QUANTUM ELECTRONICS, *SEMICONDUCTORS, ALLOYS, BARRIERS, CARBON, COMPRESSION, DISSOCIATION, DRIVES(ELECTRONICS), DYNAMICS, ELECTRODYNAMICS, ELECTRON ACCEPTORS, ELECTRON ENERGY, ELECTRONS, ENERGY, ESCAPE SYSTEMS, EXCITONS, EXPANSION, GALLIUM ARSENIDES, HIGH RATE, KINETICS, LASERS, LAYERS, MAGNETIC MATERIALS, NEUTRAL, NONEQUILIBRIUM FLOW, OPTICAL PROPERTIES, PHYSICS, PULSED LASERS, QUANTUM THEORY, RATES, RECOMBINATION REACTIONS, RELAXATION, RESONANCE, SCATTERING, SHOCK WAVES, STRUCTURES, SUBSTRATES, THINNESS, TIME, TRANSIENTS, TRANSITIONS, TUNNELING(ELECTRONICS)..

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1, Quantum wells, Multiple quantum wells.

AD-A224 735 13/6 17/1

POLYTECHNIC UNIV BROOKLYN NY

(U) In Situ Fault Detection by the Hybrid Ray Mode Method.

DESCRIPTIVE NOTE: Final rept. 1 Sep 86-28 Feb 90,

JUL 90 18P

PERSONAL AUTHORS: Felsen, Leopold B.; Klosner, J. M.

CONTRACT NO. AFOSR-86-0318

PROJECT NO. 2306

TASK NO. A3

MONITOR: AFOSR
TR-90-0829

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research effort has been to develop algorithms for in situ location and identification, by ultrasound, of flaws in plates or laminated layered elastic materials. Achieving this objective requires detailed knowledge of the excitation, propagation, scattering and detection of high frequency sound waves in the unflawed and flawed environments. Based on an understanding of these fundamental wave phenomena, one may then attempt to construct analytical models with accompanying algorithms, so as to parametrize the NDE problem in terms of good observables. During the contract period, carefully selected prototype problems have been investigated to determine 'good observables' for particular flawed environments. Two major phases have received attention: (a) phenomena within a flat layered plate, especially beam-to-mode conversion, and the consequent interaction with a weak debonding flaw; (b) characterization of transducer outputs in terms of good wave objects that facilitate coupling into and out of the plate environment. The analytical tools rely on spatial and spectral domain formulations, and they comprise self-consistent hybrid beam-mode methods; complex source modeling of Gaussian beams, with complex ray tracing to track such beams; and decomposition of general wavefields into Gaussian beams. Thus, Gaussian beams, which are 'good observables' are central to the problem strategy. (JHD)

AD-A224 735 CONTINUED

DESCRIPTORS: (U) *DETECTION, *DEFECTS(MATERIALS), *FAULTS, *ULTRASONIC TESTS, ALGORITHMS, ELASTIC PROPERTIES, FORMULATIONS, HIGH FREQUENCY, HYBRID SYSTEMS, LAMINATES, LAYERS, MATERIALS, MATHEMATICAL ANALYSIS, MATHEMATICAL MODELS, MODELS, OUTPUT, PLATES, PROTOTYPES, RAY TRACING, SCATTERING, SOUND WAVES, SOURCES, SPATIAL DISTRIBUTION, SPECTRA, STRATEGY, TRANSDUCERS.

IDENTIFIERS: (U) WUAFOSR2306A3, PE61102F, Gaussian Beams, Self Consistent Methods, Beam Mode Methods, Hybrid Ray Mode Methods.

IAC NO. NT-44339

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

IAC SUBJECT TERMS: N--(U) FAULT DETECTION, IN SITU, HIGH FREQUENCY, SOUND WAVES, ACOUSTIC WAVES, DEBONDING, ULTRASONIC BEAMS, SOUND BEAMS, ULTRASOUND, RAY TRACING, FLAW LOCATION;

AD-A224 730 9/3

TEXAS A AND M RESEARCH FOUNDATION COLLEGE STATION

(U) On-Line Quantitative Nondestructive Evaluation and Characterization of Tough Ceramics at Operating Temperatures (DURIP).

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-31 May 90,

JUN 90 7P

PERSONAL AUTHORS: Burger, Christian P.

CONTRACT NO. AFOSR-89-0112

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-90-0773

UNCLASSIFIED REPORT

ABSTRACT: (U) A grant of $70,000 from AFOSR was used to buy a 600W CO2 laser. This was combined with items bought with supplemental funds from other sources to assemble a facility for characterization of ceramic materials at extremely high temperatures (up to 2000C is anticipated) in air. The system splits the laser beam into two equal components each of which is coupled into its own computer controlled galvanometric scanner that scans the beam rapidly over a central portion of the front or back surface of a flat specimen. The scan rate and scan density is controlled to yield a test volume, in the mid-section of the specimen, that is at uniform temperature and free of thermal stresses. Related research is developing non-contact methods for stain measurements and damage detection within the central volume of material that is at the test temperature. Characterization of material properties and behavior in a wide range of severe environments will be possible with this system. Keywords: Tough ceramics, Non-destructive evaluation, High temperature. (JES)

DESCRIPTORS: (U) *LASER BEAMS, CERAMIC MATERIALS, COMPUTER APPLICATIONS, CONTROL, DAMAGE, DENSITY, DETECTION, DISCOLORATION, ENVIRONMENTS, GALVANOMETERS, HIGH RATE, HIGH TEMPERATURE, INTENSITY, MATERIALS,

AD-A224 730 CONTINUED

MEASUREMENT, NONDESTRUCTIVE TESTING, ONLINE SYSTEMS, RANGE(EXTREMES), RATES, SCANNERS, SCANNING, SURFACES, TEMPERATURE, TEST AND EVALUATION, THERMAL STRESSES, TOUGHNESS, VOLUME, YIELD.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B2.

IAC NO. NT-44340

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

IAC SUBJECT TERMS: N--(U) CO2 LASERS, CERAMIC MATERIALS, HIGH TEMPER ATURE, STRAIN(MECHANICS), MECHANICAL PROPERTIES, OPTICAL INSPECTION, OPTICAL ANALYSIS;

AD-A224 728 20/6

RICE UNIV HOUSTON TX DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Collisionally Excited XUV and VUV Coherent Sources.

DESCRIPTIVE NOTE: Final rept. 1 Jun 87-31 May 90,

MAY 90 46P

PERSONAL AUTHORS: Wisoff, P. J.

CONTRACT NO. AFOSR-87-0247

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-90-0809

UNCLASSIFIED REPORT

ABSTRACT: (U) Three types of excitation have been explored including soft x-ray pumping from laser-produced plasmas, electron beam pumping, and pulsed jet discharge pumping. Using the laser produced plasmas, new quasimetastable states of barium which radiate in the XUV have been explored and new VUV radiating molecules have been produced. Electron beam pumping has also resulted in the formation of ionic excimer molecules which radiate in the VUV, and considerable kinetic studies were performed to examine the feasibility of producing a VUV laser by this technique. This included the development of the necessary technology to allow electron beam pumping of reactive vapors at approximately 700 degree C and still maintaining compatibility with VUV detection equipment. Using the third excitation technique, pulsed jet discharge pumping, the formation of highly excited ions from the sputtering of low vapor pressure materials used in the pulsed jet nozzle were studied. (jhd)

DESCRIPTORS: (U) *FAR ULTRAVIOLET RADIATION, *VACUUM ULTRAVIOLET RADIATION, *ULTRAVIOLET SPECTROSCOPY, *ULTRAVIOLET DETECTORS, COHERENCE, ELECTRON BEAMS, EXCITATION, IONS, JET FLOW, JET PUMPS, KINETICS, LASERS, LOW PRESSURE, MATERIALS, MOLECULES, NOZZLES, PLASMAS(PHYSICS), PULSES, RADIATION, REACTIVITIES, SOFT X RAYS, SPUTTERING, VAPOR PRESSURE, VAPORS,

AD-A224 728 CONTINUED

PUMPING(ELECTRONICS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1, X Ray Pumping, Laser Produced Plasmas.

AD-A224 707 22/1

MARYLAND UNIV COLLEGE PARK SYSTEMS RESEARCH CENTER

(U) Control of Complex Multibody Spacecraft.

DESCRIPTIVE NOTE: Annual technical rept. 1 Dec 88-31 Dec 89,

DEC 89 14P

PERSONAL AUTHORS: Krishnaprasad, P. S.; Abed, Eyad; Antman, Stuart; Baras, John; Berenstein, Carlos

CONTRACT NO. AFOSR-87-0073

PROJECT NO. 3484

TASK NO. A5

MONITOR: AFOSR TR-90-0807

UNCLASSIFIED REPORT

ABSTRACT: (U) The Project C-MULTICS (Control of Complex Multibody Spacecraft) is a center of excellence at the University of Maryland. The work supported by this project is concerned with the modeling, analysis, control and simulation of large scale complex multibody spacecraft with rigid and flexible components. Keywords: Analytic mechanics; Nonlinear/distributed control; Flexible structures; Spacecraft components rigidity. (EDC)

DESCRIPTORS: (U) *CONTROL SYSTEMS, *FLEXIBLE STRUCTURES, *SPACECRAFT COMPONENTS, BODIES, DISTRIBUTION, FLEXURAL PROPERTIES, MECHANICS, NONLINEAR SYSTEMS, RIGIDITY, SIMULATION, SPACECRAFT.

IDENTIFIERS: (U) C-MULTICS Project, Multibody spacecraft, Complex structures, Distributed control systems, PE61103D, WUAFOSR3484A5.

AD-A224 660 12/3

PRINCETON UNIV NJ DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) Adaptive Equalizer Using Finite-Bit Power-of-Two Quantizer,

84 5P

PERSONAL AUTHORS: Xue, Ping; Liu, Bede

CONTRACT NO. AFOSR-81-0186

MONITOR: AFOSR
TR-90-0797

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE (Institute of Electrical and Electronics Engineers) p46.9.1-46.9.4 1984.

ABSTRACT: (U) The performance of a simplified adaptive algorithm using finite-bit power-of-two quantizer is analyzed by assuming Gaussian distributions for both input signals and equalizer output errors. The results show that in spite of its simple implementation, the performance is comparable with the least mean square (LMS) algorithm. The convergence and the stability is then studied, the output mean square error is analyzed and the effects of non-Gaussian cases are considered. Computer simulation results support the theoretical results. Reprints. (jhd)

DESCRIPTORS: (U) *EQUALIZATION, *NORMAL DISTRIBUTION, ADAPTATION, ADAPTIVE SYSTEMS, ALGORITHMS, COMPUTERIZED SIMULATION, LEAST SQUARES METHOD, MEAN, REPRINTS, SIMPLIFICATION.

IDENTIFIERS: (U) Transversal filters, LMS(Least Mean Square).

AD-A224 655 6/15

SOUTHERN ILLINOIS UNIV SCHOOL OF MEDICINE SPRINGFIELD

(U) Acute Effects of Anticholinesterase Agents on Pupillary Function.

DESCRIPTIVE NOTE: Final rept. 15 Jan 83-14 Jul 86,

SEP 86 24P

PERSONAL AUTHORS: Giacobini, Ezio

CONTRACT NO. AFOSR-83-0051

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR
TR-90-0816

UNCLASSIFIED REPORT

ABSTRACT: (U) Three main directions of our research has been pursued. New pharmacological evidence is accumulated for a mechanism of ACh release related to a muscarinic autoreceptor present in the rat iris. Secondly, the study of drug effect on release of ACh is continued, adding new groups of drugs. Finally, in the effect of aging on pupillary function and ACh metabolism are studied. These three lines of work have produced novel and intriguing results which are summarized in the enclosed section. The results described in this report have been communicated at several notional and international meetings. The abstracts of the communication are attached to the final report. Keywords: Antichloinesterases; Pupillary function; Vision. (jes)

DESCRIPTORS: (U) *EYE, ABSTRACTS, CHOLINESTERASE INHIBITORS, DRUGS, IRIS, METABOLISM, PHARMACOLOGY, RATS, VISION, ACETYLCHOLINESTERASE, AGING(PHYSIOLOGY).

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A3, *PUPIL(EYE), MUSCARINIC AUTORECEPTORS.

AD-A224 638 20/8

YALE UNIV NEW HAVEN CT DEPT OF ENGINEERING AND APPLIED SCIENCE

(U) Molecular Collision Processes in Cases and at Surfaces.

DESCRIPTIVE NOTE: Final rept. 1 Mar 84-28 Feb 85,

MAY 85 7P

PERSONAL AUTHORS: Fenn, John B.

CONTRACT NO. F49620-C-84-0038

MONITOR: AFOSR
TR-90-0817

UNCLASSIFIED REPORT

ABSTRACT: (U) Our research centers on the use of Fourier Transform Infrared Spectrometry (FTIS) to determine the distribution of rotational and vibrational energies in molecules. Our particular concern is with the effects of gas-gas and gas-surface collisions on these internal states. By studying the changes in energy and structure that occur during such collisions we aim to elucidate the kinetics and dynamics of the reactive and inelastic scattering events that play leading roles in many important processes of both technological and scientific interest. The collision processes under study are brought about with the aid of supersonic free jets expanding into vacuum from small sonic orifices or nozzles. (JES)

DESCRIPTORS: (U) *MOLECULAR PROPERTIES, COLLISIONS, DYNAMICS, ENERGY, FOURIER TRANSFORMATION, INELASTIC SCATTERING, INFRARED SPECTROSCOPY, JET AIRCRAFT, MOLECULES, NOZZLES, REACTIVITIES, SCATTERING, SUPERSONIC AIRCRAFT, VACUUM, VIBRATION.

AD-A224 637 20/11

LEHIGH UNIV BETHLEHEM PA DEPT OF MECHANICAL ENGINEERING AND MECHANICS

(U) Facility for Research in Environmentally Assisted Fracture and Mechanical Behavior.

DESCRIPTIVE NOTE: Final rept.,

JAN 86 3P

PERSONAL AUTHORS: Wei, Robert P.

CONTRACT NO. AFOSR-84-0227

MONITOR: AFOSR
TR-90-0818

UNCLASSIFIED REPORT

ABSTRACT: (U) An automated axial-torsional materials testing system has been acquired under a DoD Equipment grant to expand the capabilities for research in environmentally assisted fracture and mechanical behavior of materials. The system is capable of applying + or - 20,000 lb. axial force and 10,000 lb-in. torsion under computer control, and provides for online digital data acquisition. To supplement the DoD Grant, additional funds have been obtained to add a hydraulically operated axial-torsional specimen grip, slow-rate servovalve, and heating system for high-temperature testing. The entire system is expected to be in operation by June 1986. (JES)

DESCRIPTORS: (U) *AXES, *FRACTURE(MECHANICS), *TORSION, COMPUTERS, CONTROL, DATA ACQUISITION, DIGITAL SYSTEMS, ENVIRONMENTS, FORCE(MECHANICS), HEATING, HIGH TEMPERATURE, MATERIALS, MECHANICAL PROPERTIES, ONLINE SYSTEMS, TEST AND EVALUATION.

AD-A224 611 20/5

NATIONAL HELLENIC RESEARCH FOUNDATION ATHENS (GREECE)
THEORETICAL AND PHYSICA L CHEMISTRY INST

(U) Potential Energy Surfaces and Stability of High Energy Content Excited Bound Clusters,

JUN 90 11P

PERSONAL AUTHORS: Nicolaides, C. A.

CONTRACT NO. AFOSR-87-0348

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-90-0764

UNCLASSIFIED REPORT

ABSTRACT: (U) Our work moved along three directions whose choice was made in order to increase our understanding of the concepts of molecular energy content and stability. The direction involved first the computation of accurate adiabatic potential energy surfaces (PES) and vibrational analysis of high energy content clusters in ground and excited states in geometries of intramolecular charge transfer which give rise to closely avoided regions. These geometries are predicted a priori according to our published maximum ionicity in the excited state (MIES) theory. Keywords: Bound excited states, Tetrahydrogen, Ionic clusters. (JES)

DESCRIPTORS: (U) *CLUSTERING, *MOLECULAR PROPERTIES, HIGH ENERGY, ORIENTATION(DIRECTION), POTENTIAL ENERGY, SURFACES, VIBRATION.

AD-A224 596 7/3

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) The Determination of Rate-Limiting Steps during Soot Formation.

DESCRIPTIVE NOTE: Annual rept. Feb 89-Jan 90,

JUN 90 120P

PERSONAL AUTHORS: Colket, M. B., III; Hall, R. J.; Sangiovanni, J. J.; Seery, D. J.

REPORT NO. UTRC90-23

CONTRACT NO. F49620-88-C-0051

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-90-0763

UNCLASSIFIED REPORT

ABSTRACT: (U) A single-pulse shock tube has been used to examine the pyrolysis and rich oxidation of cyclopentadiene as well as its pyrolysis in the presence of acetylene, biacetyl, and benzene. In addition, mixtures of benzene and hydrogen have been copyrolyzed. These fuels have been diluted in argon and shock heated over the temperature range of 1200 to 2000K and at total pressures of ten to thirteen atmospheres. Dwell times were about 500-600 microseconds. Collected gas samples were analyzed using gas chromatography for hydrogen, carbon oxides and C1 to C14- hydrocarbons. Experimental results and preliminary chemical kinetic modeling lead to mechanistic proposals on the decomposition of C5-rings as well as isomerization processes between C5- and C6-rings. In addition, data on cyclopentadiene indicates that this fuel has a sooting tendency comparable to that of benzene. Keywords: Pyrolysis, Cyclopentadiene, Benzene, Hydrogen addition, Ring formation, Ring isomerization, Soot formation, Soot modeling, Single-pulse shock tube. (JES)

DESCRIPTORS: (U) *CYCLOPENTENES, ACETYLENE, ADDITION, ARGON, BENZENE, CARBON, CHEMICAL REACTIONS, DECOMPOSITION, DWELL TIME, FUELS, GAS CHROMATOGRAPHY, GASES,

AD-A224 596 CONTINUED

HYDROCARBONS, HYDROGEN, ISOMERIZATION, MIXTURES, MODELS, OXIDATION, OXIDES, PENTADIENES, PYROLYSIS, RANGE(EXTREMES), REACTION KINETICS, RINGS, SAMPLING, SOOT, TEMPERATURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A224 575 7/4

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Platinum Eta2-Disilene Complexes: Syntheses, Reactivity, and Structures,

90 8P

PERSONAL AUTHORS: Pham, Eric K.; West, Robert

CONTRACT NO. F49620-86-C-0010

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-90-0803

UNCLASSIFIED REPORT

ABSTRACT: (U) Olefin complexes of metals date back to the historic preparation of Zeise's salt in 1827. In recent years several complexes of diphosphenes, diarsenes, and distibines with transition metals have been described, and the coordination chemistry of these unsaturated ligands is now fairly well established. Reactive organosilicon species can sometimes be stabilized by coordination to a transition metal. Examples are the adduct/donar stabilized silylene complexes of ruthenium, iron, and chromium and the recent report of stable silene complexes of ruthenium. In addition, Tessier-Youngs and co-workers have prepared several Pt2Si2 ring compounds whose structural features have been discussed in terms of a bonding model involving the coordination of a planar R2SiSi R2 fragment to two metal moieties. (jes)

DESCRIPTORS: (U) *OLEFIN POLYMERS, *REACTIVITIES, BONDING, CHEMISTRY, CHROMIUM, IRON, METALS, MODELS, ORGANIC COMPOUNDS, PREPARATION, RUTHENIUM, SILICON COMPOUNDS, TRANSITION METALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A224 574 14/4

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Advanced Flow Visualization and Image Processing Instrumentation.

DESCRIPTIVE NOTE: Final rept. 1984-1985,

JUL 86 8P

PERSONAL AUTHORS: Hanson, Ronald K.

CONTRACT NO. AFOSR-84-0194

MONITOR: AFOSR
TR-90-0820

UNCLASSIFIED REPORT

ABSTRACT: (U) This award enabled purchase of three instrumentation systems used research on digital flowfield imaging of reacting flows and plasmas. System I is a high-resolution, high dynamic range, solid-state camera system; System II consisted of elements for 3d flowfield visualization; and System III is an image processing system. System I (funded in FY 84) was completed in the first year and is now in use in fluorescence-based flowfield imaging experiments. System II (funded in Fy 85) is not yet fully assembled and will be completed as part of our ongoing research. System III has recently been completed (funding was distributed between FY 84 and FY 85) and is in the final phase of being incorporated into the Laboratory computer networking system.

DESCRIPTORS: (U) *CAMERAS, COMPUTERS, DIGITAL SYSTEMS, FLOW FIELDS, FLOW VISUALIZATION, HIGH DYNAMIC RANGE, IMAGE PROCESSING, IMAGES, INSTRUMENTATION, LABORATORIES, SOLID STATE ELECTRONICS.

AD-A224 571 20/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK MATERIALS RESEARCH LAB

(U) Ultra Low Thermal Expansion Ceramics.

DESCRIPTIVE NOTE: Annual (Final) rept. Oct 85-Jun 86,

JUL 86 34P

PERSONAL AUTHORS: McKinstry, H. A.; Agrawal, D. K.; Patankar, A.; Vikram, C. S.

CONTRACT NO. AFOSR-83-0291

MONITOR: AFOSR
TR-90-0789

UNCLASSIFIED REPORT

ABSTRACT: (U) Further exploration in the (NZP) - family was carried on-in that the systematic crystal chemistry investigation of M1Zr2P3O12 (M1 = Li, Na, K, Rb and Cs) and M11Zr4P6O24 (M11 = Mg, Ca, Sr, Ba) was completed and few more new compositions were synthesized and characterized. An effort was made to grow single crystals of Na, Sr and Ca zirconium phosphates using B2O3 as flux in order to obtain more data to confirm the results obtained on powdered samples. NaGe2P3O12 was studied as a potential candidate for the development of glass-ceramic due to its low melting behavior. It has been established that sol-gel process is superior to powder method for synthesizing (NZP)-compounds and therefore most of the compositions were prepared by this route. Dielectric measurements made on CaZr4P6O24 showed that in general, (NZP)-materials have low dielectric constant with relatively low loss. New families such as diborides and A1203-GeO2 were investigated in order to search any new low thermal expansion composition with high dielectric constant. (JES)

DESCRIPTORS: (U) *CRYSTAL CHEMISTRY, BEHAVIOR, BORIDES, CERAMIC MATERIALS, CONSTANTS, DIELECTRIC PROPERTIES, DIELECTRICS, GLASS, LOW LOSS, MEASUREMENT, MELTING, PHOSPHATES, POWDER METALS, POWDERS, SAMPLING, SEARCHING, SINGLE CRYSTALS, ZIRCONIUM.

AD-A224 570 12/5 1/1

STANFORD UNIV CA

(U) Center of Excellence in Aerospace Automation.

DESCRIPTIVE NOTE: Interim rept. 1 Aug 83-31 Jul 84,

MAY 86 106P

PERSONAL AUTHORS: Cannon, Robert H., Jr

CONTRACT NO. F49620-82-C-0092

MONITOR: AFOSR
TR-90-0790

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) Progress has been made on four components of our second generation intelligent system. SUCCESSOR:(A) a geometric modeling system, (B) an advanced symbolic graphics system, (C) a system for matching structures from stereo pairs and motion sequences, and (D) ATLAS, a model-based planning system for automating the planning of assemblies development of common lisp were made to make our programs portable and to enable us to work on several computers. These developments include: SLISP a common LISP subset, on VAX:(b) TAIL, a version of SLISP on SUN workstations; (c) a real time garbage collection algorithm for Lisp in support of robotics. In addition, small development of the AL programming system continued. (kr)

DESCRIPTORS: (U) *AEROSPACE SYSTEMS, *COMPUTER PROGRAMMING, AUTOMATION, COMPUTERS, GEOMETRIC FORMS, GRAPHICS, MATCHING, MODELS, MOTION, PLANNING, ROBOTICS, SEQUENCES, STRUCTURES, SYMBOLS.

AD-A224 570

AD-A224 569 5/8

MINNESOTA UNIV MINNEAPOLIS DEPT OF PSYCHOLOGY

(U) Ability and Metacognitive Determinants of Skill Acquisition and Transfer.

DESCRIPTIVE NOTE: Final rept. 1 Jan 89-30 Apr 90,

JUN 90 91P

PERSONAL AUTHORS: Kanfer, Ruth; Ackerman, Phillip L.

CONTRACT NO. AFOSR-89-0242

PROJECT NO. 2313

TASK NO. A7

MONITOR: AFOSR
TR-90-0783

UNCLASSIFIED REPORT

ABSTRACT: (U) This report reviews a theoretical framework and empirical research concerning the interactions between cognitive abilities (both general intellectual and perceptual speed) and self-regulatory/metacognitive processes (including emotion control and motivation control) during complex skill acquisition. The framework outlines how ability and metacognitive strategies affect attention and cognitive effort as determinants of individual and group differences in task performance during skill acquisition. Specifically, the self-regulatory strategy of emotion control affects task performance early in skill acquisition, when strategy of emotion control affects task performance early in skill acquisition, when attentional resource demands are diminished. Individual differences in general ability interact with the dynamic attentional demands of complex tasks during training, and thus further interact with the influence of these two self-regulatory strategies. Two experiments delineating the interactive effects of training for emotion control and motivation control were conducted, with a criterion air traffic controller simulation task. (SDW)

DESCRIPTORS: (U) *COGNITION, *MOTIVATION, *SKILLS, *EMOTIONS, ACQUISITION, CONTROL, INTERACTIONS, JOBS, MENTAL ABILITY, PERCEPTION(PSYCHOLOGY), PERFORMANCE(HUMAN)

AD-A224 569

AD-A224 569 CONTINUED

, TIME, TRAINING, STRATEGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A7, Individual differences.

AD-A224 565 9/1

SRI INTERNATIONAL MENLO PARK CA

(U) Semiconductor Engineering for High-Speed Devices.

DESCRIPTIVE NOTE: Quarterly Status rept. no. 4, 15 Mar-13 Jun 86,

MAY 88 21P

PERSONAL AUTHORS: Sher, A.; Krishnamurthy, S.; Chen, A.-B.

CONTRACT NO. F49620-85-C-0103, ARPA Order-5396

MONITOR: AFOSR
TR-90-0815

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes major accomplishments covering the period 15 March to 13 June. A paper entitled 'Velocity Field Characteristics of III-V Semiconductor Alloys,' which was submitted to the Journal of Applied Physics is attached as Appendix A. Our aim in this period has been to expand the work to study the effect of ionized impurity scattering and strain scattering on the electron mobility. The modified electron mobility will, in turn, affect velocity-field (v-E) characteristics in semiconductors and their alloys. Ionized impurity scattering is treated in a second order perturbation theory. Our improvement over previous theories is to convert the usual integration over a parabolic energy band to a general Brillioun Zone (BZ) integration. This conversion allows us to incorporate the effect of realistic band structures into this transport calculation. (jes)

DESCRIPTORS: (U) *BZ AGENTS, *SEMICONDUCTORS, ALLOYS, COMPUTATIONS, ELECTRON MOBILITY, ENERGY BANDS, ENGINEERING, IMPURITIES, IONIZATION, PARABOLAS, PERTURBATION THEORY, SCATTERING, TRANSPORT, VELOCITY.

AD-A224 560 5/8 6/4

NEW YORK UNIV NY NEUROMAGNETISM LAB

(U) Attention, Imagery, and Memory: A Neuromagnetic Investigation.

DESCRIPTIVE NOTE: Annual technical rept. 1 Mar 89-28 Feb 90,

MAY 90 8P

PERSONAL AUTHORS: Kaufman, Lloyd; Williamson, Samuel J.

REPORT NO. TR-90-1

CONTRACT NO. F49620-88-K-0004

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-90-0779

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes work on mental imagery, short term memory scanning, language-related mental tasks, and visual attention. In the field of mental imagery it was found that searching memory to determine if or if not a visual form had been seen before, there is a change in the state of the occipital (visual) cortex. This change is commensurate in time with the reaction time indicating that the mental search is complete. It was also shown that engaging in language related tasks does not have a similar effect on visual cortex, but it does have a similar effect on temporal cortex. Using visually presented words to initiate a mental imaging task results in related changes in activity of visual cortex, and also temporal cortex. However, when the same words are used in rhyming tasks, the major effect is on left temporal cortex. Using acoustically presented words in a similar task produces parallel results, although the effects on visual cortex are not so reliability found across subjects, and both imaging and rhyming affect temporal cortex, suggesting a role for language in imagery. In another memory scanning experiment subjects attempted to determine if a musical note was or was not a member of a set of previously heard

notes. The duration of the change in brain state, implied by suppression of alpha band activity, was related to the size of the memory set, provided that it was recorded in a region that picked up activity originating in temporal areas, probably auditory cortex. (SDW)

DESCRIPTORS: (U) *IMAGES, *MEMORY DEVICES, *VISUAL PERCEPTION, *ATTENTION, ALPHA SPECTRA, BRAIN, HEARING, MENTAL ABILITY, PARALLEL ORIENTATION, REACTION TIME, RELIABILITY, SCANNING, SEARCHING, VISUAL CORTEX.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

AD-A224 559 12/6 14/2

CORNELL UNIV ITHACA NY LAB OF PLASMA STUDIES

(U) Specialized Research Equipment.

DESCRIPTIVE NOTE: Final rept. 15 Dec 84-14 Dec 85,

DEC 85 14P

PERSONAL AUTHORS: Nation, John A.

CONTRACT NO. AFOSR-85-0031

MONITOR: AFOSR
TR-90-0791

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *DATA PROCESSING EQUIPMENT, PROCUREMENT, LABORATORY EQUIPMENT, ANALOG TO DIGITAL CONVERTERS, OSCILLOSCOPES.

IDENTIFIERS: (U) WP-2252 Data acquisition systems, AD-2050 Digitizers, 7633 Storage oscilloscopes, MP-2201 Data acquisition systems.

AD-A224 558 6/5

SRI INTERNATIONAL MENLO PARK CA

(U) Role of Retinocortical Processing in Spatial Vision.

DESCRIPTIVE NOTE: Final rept. 1 May 89-1 May 90,

JUN 90 32P

PERSONAL AUTHORS: Kelly, Donald H.

CONTRACT NO. F49620-87-K-0009

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-90-0782

UNCLASSIFIED REPORT

ABSTRACT: (U) This project was an attempt to understand the major functions of early vision by considering how various components cooperate in preparing visual information to organize our perceptions of the world around us. To this end, and with the cooperation of SRI's Machine Vision Group, we assembled some of these functions in a computational working model, which can graphically display the spatial structure of the formation at a given stage of the visual process, in the form of a two-dimensional intensity array (or 'image'). This capability was developed to facilitate the study and comparison of retinal and cortical inputs and outputs of spatial information. The individual components of the model are well known, and the relations among them are based on available data from the literature. However, two aspects of this project seem novel. One is the exploitation of powerful, state-of-the-art tools of computational vision, such as Symbolics 3600-series LISP machines, to create and display our results. These tools were developed primarily for artificial intelligence purposes; they have rarely been used for basic studies in human vision. (JES)

DESCRIPTORS: (U) *VISION, ARRAYS, ARTIFICIAL INTELLIGENCE, COMPUTATIONS, GLOBAL, HUMANS, INTENSITY, MATHEMATICAL MODELS, MODELS, OUTPUT, PERCEPTION, SPATIAL DISTRIBUTION, STATE OF THE ART, TOOLS, TWO DIMENSIONAL.

AD-A224 558 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5, LPN-SRI-3558.

AD-A224 551 7/4

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Electrochemistry of Metal Surfaces.

DESCRIPTIVE NOTE: Final rept. 1 Jul 86-30 Apr 90,

JUN 90 55P

PERSONAL AUTHORS: Hubbard, Arthur T.

CONTRACT NO. AFOSR-86-0200

MONITOR: AFOSR
TR-90-0838

UNCLASSIFIED REPORT

ABSTRACT: (U) The essence of this AFOSR project is investigation of the structure, composition, mode of attachment and reactivity of the surface molecular species which form when metals come into contact with fluids. A series of findings, advances in investigation technology and 91 scientific articles have occurred thus far during this project. These include: (i) determination of the orientations and modes of attachment of organic molecules attached to electrode surfaces; (ii) demonstration that each orientation of an adsorbed molecule manifests different chemical and electrochemical reactivity; (iii) discovery that electrodeposition of metals at singal-crystal surfaces produces highly-ordered layers; (iv) discovery that contact between metal surfaces and ionic solutions forms chemically unique, ordered layers; (v) adaptation of electron energy-loss spectroscopy (EELS) for measurement of vibrational spectra of molecules adsorbed at metal surfaces from solutions; (vi) systematic study of 150 adsorbed phenols, acids, amines, pyridines, mercaptans, alcohols, alkenes and aromatics as a structure (LEED), composition (Auger), molecule construction/mode of surface attachment (EELS), chemical reactivity (all methods), and electro-chemical reactivity (cyclic voltammetry, CV); (vii) demonstration of the stability of these adsorbed layers toward vacuum and electron beams used in surface spectroscopy by performing CV before and after the electron spectra were obtained; and, (viii) studies of surface structure by means of Auger electrons. (JES)

DESCRIPTORS: (U) *ELECTROCHEMISTRY, ACIDS, ADSORPTION,

AD-A224 551 CONTINUED

ALCOHOLS, ALKENES, AMINES, AROMATIC COMPOUNDS, ATTACHMENT, AUGER ELECTRONS, AUGERS, CHEMICAL REACTIONS, CONSTRUCTION, CYCLES, DEMONSTRATIONS, DETERMINATION, ELECTRODEPOSITION, ELECTRODES, ELECTRON BEAMS, ELECTRON ENERGY, ELECTRON SPECTROSCOPY, FLUIDS, LAYERS, LOSSES, METALS, MOLECULES, ORGANIC COMPOUNDS, ORIENTATION(DIRECTION), PYRIDINES, REACTIVITIES, SPECTROSCOPY, STABILITY, SULFUR COMPOUNDS, SURFACES, THIOLS, VACUUM, VIBRATIONAL SPECTRA, VOLTAMMETRY.

IDENTIFIERS: (U) PE61102F.

AD-A224 542 14/4 14/2 20/4

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) A High-Speed Digital Camera System for Flow Visualization.

DESCRIPTIVE NOTE: Rept. for 1984-1985,

JUL 86 4P

PERSONAL AUTHORS: Brown, C. T.

CONTRACT NO. AFOSR-85-0041

MONITOR: AFOSR
TR-90-0819

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant enabled the purchase of a Spin Physics S-2000 high-speed digital camera system for use on research on turbulent reacting flows. The camera system has been employed to obtain high-speed schlieren images of pulsed jet flames and of the flow field in a dump plane combustor. In addition, the camera system has been coupled to a pulsed copper vapor laser to obtain planar images of Mie scattering from small refractory seed particles in reacting flows. These particle images can be used to obtain instantaneous planar images of the velocity field. (JHD)

DESCRIPTORS: (U) *FLOW VISUALIZATION, *HIGH SPEED CAMERAS, *JET FLAMES, COPPER, DIGITAL SYSTEMS, FLOW FIELDS, OPTICAL IMAGES, MIE SCATTERING, PLANAR STRUCTURES, PULSED LASERS, PULSES, SCHLIEREN PHOTOGRAPHY, VELOCITY.

AD-A224 538 12/3

UNIVERSITY OF SOUTH FLORIDA TAMPA

(U) Research Accomplishments,

82 7P

PERSONAL AUTHORS: Tsokos, Chris P.

CONTRACT NO. AFOSR-80-0164 8

MONITOR: AFOSR
TR-90-0792

UNCLASSIFIED REPORT

ABSTRACT: (U) During the past year, we have worked on several research projects in the areas of reliability, stochastic systems, environmental models, life and social sciences, among others. In structuring the various statistical models in the these areas, our aim was to clearly identify the problem under investigation, formulate the problem in such a manner so as to be mathematically complete, illustrate the usefulness of our findings with real data when available or depend on numerical simulation and interpret the final results. (KR)

DESCRIPTORS: (U) , ENVIRONMENTS, MATHEMATICAL MODELS, MODELS, NUMERICAL ANALYSIS, RELIABILITY, SOCIAL SCIENCES, STATISTICAL ANALYSIS, STOCHASTIC PROCESSES.

AD-A224 537 20/11

NORTHWESTERN UNIV EVANSTON IL DEPT OF CIVIL ENGINEERING

(U) Dynamic Effects on Fracture.

DESCRIPTIVE NOTE: Final rept. 1 Jul 78-31 Dec 84,

APR 85 31P

PERSONAL AUTHORS: Achenback, J. D.

CONTRACT NO. AFOSR-78-3589, AFOSR-83-0308

MONITOR: AFOSR
TR-90-0814

UNCLASSIFIED REPORT

ABSTRACT: (U) The research work on this project has been concerned with dynamic effects on fracture. Two main areas have been investigated: 'high-rates loads on bodies containing cracks,' and 'fast fracture and crack arrest.' Dynamic effect become important if the external loads give rise to propagating mechanical disturbances (as for impact loads and explosive charges) which can strike a crack and cause crack propagation. Spalling is an example of a fracture phenomenon caused by the rapid application of loads. Dynamic effects become also important if a crack propagates very rapidly, so that rapid motions are generated in the solid. Even though in most cases fracture studies should focus on despite the best attempts for prevention. (JES)

DESCRIPTORS: (U) *FRACTURE(MECHANICS), CRACK PROPAGATION, DYNAMICS, EXPLOSIVE CHARGES, EXTERNAL, IMPACT, LOADS(FORCES), MECHANICAL PROPERTIES, MOTION, PROPAGATION.

AD-A224 525 12/7

COLLEGE OF WILLIAM AND MARY WILLIAMSBURG VA

(U) Reliability Computations for Planar Networks,

90 16P

PERSONAL AUTHORS: Whited, David E.; Shier, Douglas R.; Jarvis, James P.

CONTRACT NO. AFOSR-89-0071

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0770

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in ORSA Jnl. on Computing, v2 n1 p46-60 1990.

ABSTRACT: (U) The two-terminal reliability problem for an undirected network involves calculating the probability that two distinguished sites are connected by a path of working edges. This problem is known to be NP-hard, even for the special case of planar systems. We present efficient data structures and algorithms for manipulating planar networks and for generating both paths and cutsets in such networks. A pseudopolynomial algorithm is then implemented, based on these generation procedures, to calculate two-terminal reliability for planar networks; that is, the algorithms's time complexity is polynomially bounded in the number of paths (or the number of cutsets). Computational experience with this implementation is also presented in this reprints showing that it provides a substantial improvement over previous implementations of the pseudopolynomial algorithms. (KR)

DESCRIPTORS: (U) , ALGORITHMS, COMPUTATIONS, DATA BASES, EDGES, EFFICIENCY, NETWORKS, PATHS, PLANAR STRUCTURES, RELIABILITY, REPRINTS, TIME.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

AD-A224 525

AD-A224 524 12/7 9/1

COLLEGE OF WILLIAM AND MARY WILLIAMSBURG VA

(U) Algorithms for Approximating the Performance of Multimode Systems,

JUN 90 10P

PERSONAL AUTHORS: Shier, D. R.; Bibelnieks, E.; Jarvis, J. P.; Lakin, R. J.

CONTRACT NO. AFOSR-89-0071

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0769

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of INFOCOM '90, p741-748 Jun 90.

ABSTRACT: (U) Communication networks, electrical power networks, and other complex systems can be modeled as a collection of independent components, each of which can operate in one of several modes. Since exact calculation of the performance or reliability of such systems is known to be intrinsically difficult, recent research has focused on partial state enumeration as an approximation method. Although the state space grows exponentially, many practical problems have the property that most of the state probability is captured in relatively few states. This paper discusses computational refinements to a number of previously developed methods for partial state enumeration and also presents two new methods which exhibit promising empirical behavior. Keywords: Reprints, Conference on computer communications. (KR)

DESCRIPTORS: (U) *COMMUNICATIONS NETWORKS, *COMPUTER COMMUNICATIONS, *NETWORK ANALYSIS(MANAGEMENT), ALGORITHMS, COLLECTION, COMPUTATIONS, COUNTING METHODS, ELECTRIC POWER, ELECTRICAL NETWORKS, MULTIMODE, PERFORMANCE(ENGINEERING), PROBABILITY, RELIABILITY, REPRINTS, SYMPOSIA, SYSTEMS ENGINEERING, APPROXIMATION(MATHEMATICS).

AD-A224 524

AD-A224 524 CONTINUED

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

AD-A224 509 11/4 11/10

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MECHANICAL ENGINEERING

(U) The Overall Response of Composite Materials Undergoing Large Elastic Deformations.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 89-31 Mar 90,

JUN 90 66P

PERSONAL AUTHORS: Castaneda, Pedro P.

CONTRACT NO. AFOSR-89-0288

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-90-0765

UNCLASSIFIED REPORT

ABSTRACT: (U) The main goal of this project is to estimate theoretically the overall or effective constitutive properties of nonlinear composite materials undergoing large deformations. Two types of large deformations are of interest; large elastic deformations, and large viscous deformations. The proposed method is to apply variational principles that are under development to characterize the range of the effective properties given partial statistical information about the microstructure (such as the volume fractions of the phases). For some particular microstructures of interest exact estimates may be given. Significant progress was made over the first year with the development of a new variational principle allowing the estimation of the effective properties of a given nonlinear composite in terms of the effective properties of linear composites (which are assumed to be known). The potential significance of this work derives from its simplicity allowing the application of a large body of prior research on linear composites to nonlinear composites. The method has been applied to the case of large viscous deformations, and some results for particular materials systems have already been reported in the pertinent literature. Keywords: Nonlinear composites; Finite elasticity; Creep; Plasticity; Variational principles;

AD-A224 509 CONTINUED

Solid rocket fuel.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *DEFORMATION, *ELASTIC PROPERTIES, CREEP, MICROSTRUCTURE, NONLINEAR SYSTEMS, PLASTIC PROPERTIES, RESPONSE, SOLID ROCKET FUELS, STATISTICAL DATA, VARIATIONAL PRINCIPLES, VISCOSITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B2.

AD-A224 504 20/11

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Research into Traveling Wave Control in Flexible Structures.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-28 Feb 90,

JUN 90 180P

PERSONAL AUTHORS: Von Flotow, Andreas H.

CONTRACT NO. AFOSR-88-0029

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-90-0837

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes 16 months of research into active control of elastic wave propagation in flexible structures. The report format is that of a brief executive summary supported by an extensive appendix containing the research publications generated in the course of this research. The research performed can be broken into two major fields: (1) Broadband damping by impedance matching the control system to the underlying wave (or dereverberated) impedance of a flexible structure; (2) Sensor developement for purposes of wave observation and control. (JHD)

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, *IMPEDANCE MATCHING, *TRAVELING WAVES, BROADBAND, CONTROL, CONTROL SYSTEMS, DAMPING, ELASTIC WAVES, OBSERVATION, REPORTS, WAVE PROPAGATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A224 500 21/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MECHANICAL ENGINEERING

(U) Flame-Turbulence Interactions in a Freely-Propagating, Premixed Flame,

90 28P

PERSONAL AUTHORS: Videto, B. D.; Santavicca, D. A.

CONTRACT NO. AFOSR-87-0097

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-90-0767

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Combust. Sci. and Tech., v70 p47-73 1990.

ABSTRACT: (U) Previous experimental investigations of turbulence measurements in conventional laboratory premixed flames are extensively reviewed. Because of numerous disadvantages of these configurations, primarily associated with flame stabilization mechanisms, a freely-propagating flame configuration is proposed for the study of flame-turbulence interactions. The unperturbed, unrestrained flow field in this configuration is ideal for measuring the effect of of the flame on turbulence properties. Temporally resolved, ensemble averaged measurements of turbulence intensity, integral length scale, integral time scale, and energy spectrum have been measured both normal and parallel to the mean flame surface with laser Doppler velocimetry (LDV) in a propane-air flame at an equivalence ratio of 1.0, in a flow with incident turbulence intensity of 25 cm/s and length scale of 8 mm. The following changes in turbulence parameters were observed across the flame: a factor of five to six increase in the normal turbulence intensity, a factor of two to three increase in the parallel turbulence intensity, a factor of two increase in the density weighted turbulent kinetic energy, a 100% increase in the normal length scale, a 50% increase in the parallel length scale, an increase in turbulence time scale, and a

AD-A224 500 CONTINUED

slight shifting of turbulence energy towards lower frequencies in the normal component. These results indicate that turbulence production in the flame is significant, and is anisotropic in nature. Keywords: Premixed turbulent combustion, Flame generated turbulence, Reprints. (JHD)

DESCRIPTORS: (U) *FLAMES, *TURBULENCE, *FLAME PROPAGATION, COMBUSTION, DOPPLER SYSTEMS, ENERGY, FLOW FIELDS, INTENSITY, LASER VELOCIMETERS, LENGTH, MEAN, MEASUREMENT, MIXING, PARAMETERS, PRODUCTION, REPRINTS, RESTRAINT, SCALE, SHIFTING, SPECTRA, STABILIZATION, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A224 499 21/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MECHANICAL ENGINEERING

(U) A Fractal Model of Turbulent Flame Kernel Growth,

90 13P

PERSONAL AUTHORS: Santavicca, Domenic A.; Liou, Deryuh; North, Gary L.

CONTRACT NO. AFOSR-87-0097

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-90-0766

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SAE Technical Paper Series 900024, 9p 1990.

ABSTRACT: (U) A model of turbulent flame kernel growth has been developed based on the fractal nature of premixed turbulent flame structure. The flame kernel model uses a recently developed heuristic model for the fractal dimension of premixed turbulent flame surfaces in order to predict the flame kernel's structure. The fractal flame kernel model requires independent knowledge of the turbulence intensity, Kolmogorov scale, integral scale and energy spectrum, as well as, the laminar flame speed. Comparisons with measurements from the turbulent flow tunnels and engines show good agreement with the fractal model's predictions. Keywords: Turbulent flame growth; Reprints. (JHD)

DESCRIPTORS: (U) *FLAMES, *TURBULENCE, ENERGY, FRACTALS, GROWTH(GENERAL), HEURISTIC METHODS, INTENSITY, LAMINAR FLOW, MATHEMATICAL MODELS, MIXING, REPRINTS, SCALE, SPECTRA, SURFACES, TURBULENT FLOW, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A224 498 20/8

WASHINGTON UNIV SEATTLE DEPT OF PHYSICS

(U) Antiproton Studies in Penning Traps.

DESCRIPTIVE NOTE: Final rept. 1 Feb 86-31 Dec 88,

DEC 88 7P

PERSONAL AUTHORS: Gabrielse, Gerald

CONTRACT NO. AFOSR-86-0069

PROJECT NO. 2301

TASK NO. B2

MONITOR: AFOSR TR-90-0836

UNCLASSIFIED REPORT

ABSTRACT: (U) During the course of this research, several trips were made to LEAR (the Low Energy Antiproton Ring) in Geneva. On one trip, the feasibility of using a thick beryllium degrader to slow antiprotons enough to permit capture was established. On another trip, approximately 1000 antiprotons were captured and held for about ten minutes. Subsequently, a completely new apparatus was designed using a proper superconducting magnet, and a beam line at LEAR was designed for the mass measurement. At the end of the research period, all apparatus and arrangements were complete for making the measurement of the antiproton inertial mass. Keywords: Antimatter, Antiproton, Trapping. (JHD)

DESCRIPTORS: (U) *ANTIPROTONS, *TRAPPING(CHARGED PARTICLES), BERYLLIUM, MAGNETS, MASS, MEASUREMENT, SUPERCONDUCTORS, THICKNESS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301B2, LEAR(Low Energy Antiproton Rings), Penning traps.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A224 467 20/6.1

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) 1. Novel Dopants in Silica Based Fibers. 2. Applications of Embedded Optical Fiber Sensors in Reinforced Concrete Buildings and Structures.

DESCRIPTIVE NOTE: Final rept. 1 Dec 87-30 Nov 89,

MAY 90 40P

PERSONAL AUTHORS: Morse, T. F.

CONTRACT NO. AFOSR-88-0061

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-90-0777

UNCLASSIFIED REPORT

ABSTRACT: (U) Applications of Embedded Optical Fiber Sensors in Reinforced Concrete Buildings and Structures. The potential use of optical fiber sensors embedded, prior to curing, in reinforced concrete buildings and in structures such as bridges, dams and tanks is discussed with regards to the non-destructive measurement of internal strain, and the evaluation of structural integrity. Novel applications in the areas of structural monitoring, experimental stress analysis and in the management and control of service installations are presented. A discussion of the fundamental issues regarding the practical implementation of this technology is given. (rh)

DESCRIPTORS: (U) , BRIDGES, BUILDINGS, CONTROL, DAMS, EMBEDDING, FIBER OPTICS, FIBERS, INSTALLATION, MEASUREMENT, MONITORING, NONDESTRUCTIVE TESTING, OPTICAL DETECTORS, REINFORCED CONCRETE, RELIABILITY, SILICON DIOXIDE, STRESS ANALYSIS, STRUCTURAL PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1, MCVD(Modified Chemical Vapor Deposition).

IAC NO. NT-44259

AD-A224 467 CONTINUED

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

IAC SUBJECT TERMS: N--(U) OPTICAL FIBERS, EMBEDDED SENSORS, REINFORCED CONCRETE, FIBER OPTICS, FABRICATION, LASERS, AEROSOLS, STRUCTURAL INTEGRITY, BRIDGES, STRESS ANALYSIS, DETECTION, DAMAGE, INTERNAL INTERFEROMETERS, STRAIN(MECHANICS), IN SITU;

AD-A224 465 21/2 19/9

ILLINOIS UNIV AT URBANA DEPT OF AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

(U) The Structure and Stability of Three Dimensional Detonation Waves.

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Apr 90,

APR 90 12P

PERSONAL AUTHORS: Buckmaster, John

CONTRACT NO. AFOSR-86-0143

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-90-0768

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *DETONATION WAVES, FLAMES, FLAME PROPAGATION, ARRHENIUS EQUATION, DOUBLE BASE PROPELLANTS, REACTION KINETICS, MACH NUMBER, HYDROGEN, ABSTRACTS.

IDENTIFIERS: (U) Diffusion flames.

AD-A224 435 9/3

CITY COLL NEW YORK INST FOR ULTRAFAST SPECTROSCOPY AND LASERS

(U) Picosecond and Femtosecond Spectroscopic Instrumentation for Ultrafast Spectroscopy and Lasers.

DESCRIPTIVE NOTE: Final rept.,

MAR 86 8P

PERSONAL AUTHORS: Alfano, R. R.

CONTRACT NO. AFOSR-85-0055

MONITOR: AFOSR
TR-90-0827

UNCLASSIFIED REPORT

ABSTRACT: (U) The scope of this program was to upgrade the research capabilities by acquiring state-of-the-art ultrafast laser and diagnostic instrumentation. The following areas were targeted for enhancement. (1) Femtosecond Laser System. Replacement of the obsolete Q-switch Nd:YAG laser. (2) Multichannel spectroscopic system for ultrafast time-resolved spectroscopy. (3) A 2-psec streak camera system for time-resolved luminescence spectroscopy. (RH)

DESCRIPTORS: (U) *LASERS, *SPECTROSCOPY, DIAGNOSTIC EQUIPMENT, HIGH RATE, INSTRUMENTATION, LUMINESCENCE, MULTICHANNEL, STATE OF THE ART, TIME, YAG LASERS.

AD-A224 433 12/3

CALIFORNIA UNIV BERKELEY DEPT OF INDUSTRIAL ENGINEERING AND OPERATIONS RESEAR CH

(U) Systems Reliability and Inference. Summary of Accomplishments 1988-1990.

DESCRIPTIVE NOTE: Final rept. 1 Jun 86-30 Sep 89,

SEP 89 10P

PERSONAL AUTHORS: Jewell, William S.

CONTRACT NO. AFOSR-86-0208

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0778

UNCLASSIFIED REPORT

ABSTRACT: (U) Research on systems reliability and inference were focussed on three major areas: linear approximations for estimating first and second moments for a variety of different models; delayed reporting models, with emphasis on predicting unreported counts generated over a fixed exposure interval; and generalized models of life testing with incomplete data. Contents: Approximations for Bayesian Estimation and Prediction; Delayed Reporting Models; Life Testing with Incomplete Data. (KR)

DESCRIPTORS: (U) *LIFE TESTS, *RELIABILITY, *STATISTICAL INFERENCE, APPROXIMATION(MATHEMATICS), BAYES THEOREM, ESTIMATES, EXPOSURE(GENERAL), INTERVALS, LINEAR SYSTEMS, MODELS, MOMENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A224 433

AD-A224 431 12/3 6/4

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Propagation of Chaos and the McKean-Vlasov Equation in Duals of Nuclear Spaces,

MAY 90 48P

PERSONAL AUTHORS: Chiang, T. S.; Kallianpur, G.; Sundar, P.

REPORT NO. TR-298

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0804

UNCLASSIFIED REPORT

ABSTRACT: (U) The paper is concerned with propagation of chaos problems for systems with an infinite number of degrees of freedom such as strings or spatially extended neurons. The investigation of the asymptotic behavior of the voltage (membrane) potentials of large assemblages of interacting neurons leads to precisely such problems and provided the immediate motivation for the work. Another example to which the approach of the present paper could be applied is the Ginsburg-Landau model in hydrodynamics. Basic properties of duals of nuclear spaced (denoted throughout by Psi, the strong dual of a countably Hilbertian nuclear space Psi) are briefly discussed and the results fo Kallianpur et al. on the existence and uniqueness of the solution to (the martingale problem posed by) a Psi-valued stochastic differential equation (SDE) is extended to a system of such equations. The principal results in which the infinite dimensionality of our problem call for special arguments are derived. (JHD)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, ASYMPTOTIC SERIES, DIFFERENTIAL EQUATIONS, HYDRODYNAMICS, NERVE CELLS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, Chaos, McKean

AD-A224 431

AD-A224 431 CONTINUED

Vlasov equation, Nuclear spaces, String theory, Ginsburg Landau model, Martingales(Mathematics), Uniqueness theorems, Existance theorems, *Stochastic differential equations.

AD-A224 421 5/8

ILLINOIS UNIV AT URBANA DEPT OF PSYCHOLOGY

(U) Reminding-Based Learning.

DESCRIPTIVE NOTE: Annual technical rept. 21 Jun 89-20 Jun 90,

JUL 90 13P

PERSONAL AUTHORS: Ross, Brian H.

CONTRACT NO. AFOSR-89-0447

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-90-0775

UNCLASSIFIED REPORT

ABSTRACT: (U) When learning new cognitive skills involving problem solving, novices are often reminded of earlier problems. The use of earlier problems is a common means of problem solving and affects the learning of the skill. This project has three aims in understanding this learning. First, the representation of the resulting generalizations is being examined. Generalizations formed from remindings are likely to be conservative, in that they may be more tied to the examples than many current theories allow. A main aim of the project is to distinguish and test different forms of this conservatism. Second, the development of problem solving expertise is examined by focusing on differences in how typical and atypical problems are solved. Third, the effects of such reminding-based learning in everyday problem solving is examined to extend the findings and test some theoretical ideas that are difficult to investigate in more formal domains. (sdw)

DESCRIPTORS: (U) *COGNITION, *LEARNING, PROBLEM SOLVING, SKILLS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

AD-A224 412 20/2

AMERASIA TECHNOLOGY INC WESTLAKE VILLAGE CA

(U) Higher Order Acoustic Rayleigh Modes for Sensor Applications,

MAY 85 91P

PERSONAL AUTHORS: Staples, Edward J.

MONITOR: AFOSR
TR-90-0785

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Stanford Univ., Palo Alto, CA. Materials Science and Engineering.

ABSTRACT: (U) The objective of this project was to establish the theoretical foundations for applying higher order Rayleigh and interface modes to resonators for high stability sensors. Theoretical studies of the characteristics of Rayleigh waves in single and multi-layer structures were carried out for ST-cut Quartz substrates. Specified materials for this study were MgO, Y2O3, AlN, SiOx, Al2O3, and TiO2. Velocity dispersion and coupling to bulk modes were predicted and confirmed by comparison with experimental results for sputtered films. Stoneley (interfacial) waves were investigated as possible candidates for resonator structures because of their inherently stable and low cost geometry without any type of hermetic enclosure or package. A successful search technique was developed which accurately predicts the existence of Stoneley waves in general anisotropic (and piezoelectric) materials. Using this technique, Stoneley waves were for the first time predicted in single crystal quartz. Several useful orientations where Stoneley waves are well bound and piezoelectrically active were found to exist. (rh)

DESCRIPTORS: (U) , COSTS, COUPLING(INTERACTION), DETECTORS, DISPERSING, GEOMETRY, LAYERS, LOW COSTS, QUARTZ, RAYLEIGH WAVES, RESONATORS, SEARCHING, SINGLE CRYSTALS, STABILITY, STRUCTURES, THEORY, VELOCITY.

IDENTIFIERS: (U) Stonley waves.

AD-A224 410 11/4

DAYTON UNIV OH RESEARCH INST

(U) Workshop on the Chemical Processing of Structural Ceramics for Use in Severe Environments Held in Dayton, Ohio on 16-18 July 1984,

JUL 84 300P

PERSONAL AUTHORS: Hecht, Norman L.; Graves, George A.; Rhine, Wendell E.

MONITOR: AFOSR
TR-90-0786

UNCLASSIFIED REPORT

ABSTRACT: (U) Recent advancements in several new and promising technologies have resulted in the availability of a diversity of improved structural ceramic materials through tha development of novel chemical processing methods. As a result, the potential for utilizing ceramic materials in a number of advanced Air Force applications has been significantly expanded. (jes)

DESCRIPTORS: (U) *CERAMIC MATERIALS, AIR FORCE OPERATIONS, CHEMICALS, CONSTRUCTION MATERIALS, ENVIRONMENTS, HIGH RATE, INTENSITY, METHODOLOGY, MILITARY APPLICATIONS, PROCESSING, STRUCTURAL PROPERTIES.

AD-A224 382 20/15 6/7

MISSOURI UNIV-COLUMBIA DEPT OF PHYSICS

(U) Microscopic Models for Electromagnetic Wave Propagation in Highly Dispersive Media.

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Apr 90,

JUN 90 12P

PERSONAL AUTHORS: DeFacio, Brian

CONTRACT NO. AFOSR-89-0311

PROJECT NO. 6177

TASK NO. 57

MONITOR: AFOSR
TR-90-0772

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this project was to advance the understanding of the propagation of ultrafast picosecond electromagnetic pulses in Biological solutions and ultimately, in human tissue. Present day standards of the allowed electromagnetic doses do not include dispersion, modulation or envelope effects, memory or nonlinearity. It is well-known experimentally that biological solutions are highly dispersive. It is plausible, but not established, that modulation, memory and nonlinearity may be important in biological solutions. Hence, this project represents a first step toward better standards. (jhd)

DESCRIPTORS: (U) *ELECTROMAGNETIC PULSES, *ELECTROMAGNETIC WAVE PROPAGATION, *TISSUES(BIOLOGY), BIOLOGY, DISPERSIONS, DOSAGE, ELECTROMAGNETISM, ENVELOPE(SPACE), HUMAN BODY, MEDIA, MICROSCOPY, MODELS, MODULATION, NONLINEAR SYSTEMS, SOLUTIONS(GENERAL), STANDARDS.

IDENTIFIERS: (U) PE62202F, WUAFOSR617757.

AD-A224 382

AD-A224 381 6/5

YALE UNIV NEW HAVEN CT

(U) A Circuit Analysis and Computational Model of Operant Conditioning in Aplysia.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jul 89-30 Jun 90,

JUN 90 5P

PERSONAL AUTHORS: Carew, Thomas J.

CONTRACT NO. AFOSR-89-0362

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR
TR-90-0774

UNCLASSIFIED REPORT

ABSTRACT: (U) Our primary objective is to carry out a cellular and computational analysis of operant conditioning of the headwaving response in Aplysia. Progress has been made in four areas: (1) We have now unequivocally identified the neural pathway essential for reinforcement: a bilateral set of nerves from the oral veil. (2) We have achieved reliable stimulus control over the operant response (headwaving) by our discovery that Aplysia shows a strong positive phototaxis to a directional light source. (3) We have identified the neural pathway necessary for phototaxis: the nerves from the primary visual organs (the eyes and rhinophores). (4) We have preliminary evidence that headwaving motor neurons can be operantly conditioned (by direct injection of hyperpolarizing or depolarizing current, paired with reinforcement) to increase or decrease their spontaneous firing rate. (jes)

DESCRIPTORS: (U) *PSYCHOLOGY, APLYSIA, CELLS, CIRCUIT ANALYSIS, COMPUTATIONS, CONTROL, DIRECTIONAL, EYE, FIRING RATES, INJECTION, LIGHT SOURCES, MATHEMATICAL MODELS, MOTOR NEURONS, NERVES, ORGANS(ANATOMY), RELIABILITY, STIMULI, VISION.

IDENTIFIERS: (U) WUAFOSR2312A1, PE61102F, *Operant

AD-A224 381

AD-A224 381 CONTINUED

Conditioning.

AD-A224 380 9/1

STANFORD UNIV CA DEPT OF APPLIED PHYSICS

(U) Superconducting Thin Films, Composites and Functions.

DESCRIPTIVE NOTE: Interim technical rept. 1 Oct 84-31 Mar 85,

AUG 85 8P.

PERSONAL AUTHORS: Geballe, T. H.

CONTRACT NO. F49620-82-C-0014

MONITOR: AFOSR
TR-90-0802

UNCLASSIFIED REPORT

ABSTRACT: (U) The important issue of how the superconducting transition temperature Tc in disordered systems changes near the M-I transition where strong localization is expected has been studied in the Mo-Ge system. In the high Mo concentration, which is in the weakly localized regime, Tc decreases linearly with decreasing Mo concentration from 7.5 K (78 at Mo) at a rate of 0.18 K/at % Mo. In this region the ratio of electron-phonon coupling constant Lambda to the bare density of states Mb (0) is constant, which is consistent with the Varma-Dynes tight-binding model. An extrapolation of the linear behavior of Tc in this regime yields the disappearance of Tc near 35 at Mo. However, measurements show that Tc exists down to 13.5 at Mo. A non-superconducting metallic phase is found to exist between 13.5 at 10.4 at Mo at which concentration the insulating phase occurs. (jes)

DESCRIPTORS: (U) *SUPERCONDUCTIVITY, COUPLING(INTERACTION), DENSITY, ELECTRONS, INSULATION, LINEARITY, ORDER DISORDER TRANSFORMATIONS, PHONONS, RATIOS, SUPERCONDUCTORS, THIN FILMS, TRANSITION TEMPERATURE, YIELD.

AD-A224 379 9/3

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

(U) Laser Physics and Laser Spectroscopy.

DESCRIPTIVE NOTE: Final rept. 15 Sep 88-14 Nov 89,

APR 90 85P

PERSONAL AUTHORS: Byer, Robert L.

CONTRACT NO. AFOSR-88-0354

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-90-0776

UNCLASSIFIED REPORT

ABSTRACT: (U) Two essential difficulties must be addressed in any low-power frequency conversion device; boosting the efficiency above that of simple single-pass bulk devices (which are typically less than 1%/W) and achieving phase-matching for the desired interaction. Waveguide interactions were used to increase the conversion efficiency, and explored quais-phase-matching (QPM) as a broadly applicable approach to meeting the phasematching condition. Both oxide forrelectrics like LiNbO3 and quantum-wells in III-V semiconductors have been investigated for these applications. Second harmonic generation (SHG) of near-infrared lasers to produce green and blue radiation, as well as SHG of the 9-11 micrometer output of a CO2 laser have been demonstrated in these materials. These media together constitute a significant step towards the goal of generic nonlinear media for the far-infrared - ultraviolet, based on readily available materials and fabricated with standard technologies, applicable to essentially any frequency conversion application. (jes)

DESCRIPTORS: (U) *LASERS, *SPECTROSCOPY, BLUE(COLOR), CONVERSION, EFFICIENCY, FREQUENCY CONVERSION, GROUP III COMPOUNDS, GROUP V COMPOUNDS, HARMONIC GENERATORS, INTERACTIONS, LOW POWER, MEDIA, NEAR INFRARED RADIATION, NONLINEAR SYSTEMS, PHYSICS, RADIATION, SEMICONDUCTORS, WAVEGUIDES.

AD-A224 379 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A224 357 9/5

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Time-Resolved Diode Laser Absorption Spectroscopy of CF2 Produced in UV Photodissociation of C2F4 and Measurement of Upsilon3 Absorption Band Strength.

DESCRIPTIVE NOTE: Scientific Interim rept.,

APR 90 6P

PERSONAL AUTHORS: Suto, O.; Steinfeld, J.

CONTRACT NO. F49620-86-C-0003

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-90-0746

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v168 n2 p181-184, 27 Apr 90.

ABSTRACT: (U) Difluorocarbene (CF2) has been observed by time-resolved diode laser absorption spectroscopy following excimer-laser photolysis of C2F4. A band strength of 2.8 X 10-17 cm molecule-1 for the v3 band may be inferred from the absorption measurements, assuming a quantum yield CF2 = 2 from C2F4 photodissociation. This agrees, well with other experimental estimates, but is somewhat lower than theoretical predictions. Keywords: Photodissociation, Difluorocarbene, Transient spectroscopy. (JES)

DESCRIPTORS: (U) *PHOTODISSOCIATION, ABSORPTION, ESTIMATES, MEASUREMENT, PREDICTIONS, SPECTROSCOPY, THEORY, TRANSIENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A224 356 6/1

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Molecular 'Light Switch' for DNA: Ru(bpy)2(dppz)2+.

DESCRIPTIVE NOTE: Rept. for 1988-90,

90 4P

PERSONAL AUTHORS: Friedman, Alan E.; Chambron, Jean-Claude; Sauvage, Jean-Pierre; Turro, Nicholas J.; Barton, Jacqueline K.

CONTRACT NO. AFOSR-88-0043

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-90-0759

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v112 p4960-4962 1990.

ABSTRACT: (U) Ru(bpy)2(dppz)2+ is a highly sensitive spectroscopic reporter of double-helical DNA. In aqueous solution, luminescence is detectable only when Ru(bpy) 2(dppz)2+ has intercalated in (or is perhaps otherwise shielded by)2 the nucleic acid structure. The emission characteristics furthermore sensitively distinguish both in terms of intensity and emission maximum the different helical forms of the polynucleotide. Therefore, we conclude that Ru(bpy)2(dppz) can serve as a true molecular 'light switch' for DNA structures, and tethered onto oligonucleotides, the complex may be useful as a sensitive, nonradioactive, luminescent DNA probe in both heterogeneous and homogeneous assays. (JES)

DESCRIPTORS: (U) +DEOXYRIBONUCLEIC ACIDS, *NUCLEIC ACIDS, ASSAYING, EMISSION, HETEROGENEITY, HOMOGENEITY, INTENSITY, LIGHT, LUMINESCENCE, MOLECULES, PROBES, SOLUTIONS(MIXTURES), STRUCTURES, SWITCHES, WATER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A224 329 6/1 24/4

MEHARRY MEDICAL COLL NASHVILLE TN

(U) Transformation and Precipitation of Toxic Metals by Pseudomonas maltophilia.

DESCRIPTIVE NOTE: Annual rept. 1 May 89-30 Apr 90,

MAY 90 9P

PERSONAL AUTHORS: Blake, Robert, II

CONTRACT NO. F49620-89-C-0052

MONITOR: AFOSR
TR-90-0699

UNCLASSIFIED REPORT

ABSTRACT: (U) The aims of this research are to study each of the various molecular mechanisms whereby toxic metal cations and oxyanions are chemically transformed by Pseudomonas maltophilia strain OR-02. The research effort for the current year has focused on the microbial-dependent transformations of selenite, tellurite, lead, and chromate. The reduction of selenite and tellurite to their insoluble elemental forms appeared to be mediated by an intracellular glutathione reductase that utilized the spontaneously-formed bis(glutathio)Se or bis(glutathio)Te, respectively, as pseudosubstrates. The biomolecules responsible for the extracellular transformation of lead and the reduction of chromate to Cr(III) are currently under investigation. This project could provide useful information toward the eventual exploitation of P. maltophilia and related organisms for the removal of toxic metal wastes from selected, heavily polluted sites. (jes)

DESCRIPTORS: (U) *METALS, *TOXICITY, *WATER POLLUTION, BIOMOLECULES, CATIONS, CELLS(BIOLOGY), ENZYMES, GLUTATHIONE, MOLECULAR PROPERTIES, PRECIPITATION, SITES, TRANSFORMATIONS, WASTES.

AD-A224 329

AD-A224 328 12/4

STANFORD UNIV CA DEPT OF OPERATIONS RESEARCH

(U) New Approaches to Linear and Nonlinear Programming.

DESCRIPTIVE NOTE: Final rept. 1 Mar 87-28 Feb 89,

DEC 89 9P

PERSONAL AUTHORS: Murray, Walter; Saunders, Michael A.

CONTRACT NO. AFOSR-87-0196

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-90-0662

UNCLASSIFIED REPORT

ABSTRACT: (U) The project involves study of the theoretical properties and computational performance of techniques that solve linear and nonlinear programs by means of nonlinear transformations. The group at the Systems Optimization Laboratory (SOL) were the first to recognize the connection between Karmarkar's (1984) projective method and the logarithmetic barrier method (see Gill, Murray, Saunders, Tomlin and Wright, 1986). It is now generally recognized that essentially all interior-point methods for linear programming inspired by Karmarkar's method are closely related to application of Newton's method to a sequence of barrier functions (see e. g., Gonzaga, 1987; Renegar, 1988, Anstreicher, 1988). Each barrier function is defined from the objective function and a barrier term that is infinite along the boundary of the feasible region. As the weight on the barrier term is reduced to zero, the solution of the subproblem becomes closer to the solution of the original problem. (kr)

DESCRIPTORS: (U) *LINEAR PROGRAMMING, *NONLINEAR PROGRAMMING, BARRIERS, COMPUTATIONS, FUNCTIONS, LABORATORIES, NONLINEAR SYSTEMS, OPTIMIZATION, SEQUENCES, TRANSFORMATIONS, WEIGHT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A8.

AD-A224 328

AD-A224 327 20/4

CALIFORNIA UNIV DAVIS

(U) Particle Dispersion in a Turbulent Shear Flow.

DESCRIPTIVE NOTE: Annual rept. 15 May 89-14 May 90,

MAY 90 7P

PERSONAL AUTHORS: Kennedy, Ian M.; Kollmann, Wolfgang

CONTRACT NO. AFOSR-89-0392

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-90-0685

UNCLASSIFIED REPORT

ABSTRACT: (U) A joint experimental and numerical study of droplet dispersion in a round turbulent jet has been initiated. Laser light scattering was used to measure the motion of non-vaporizing droplets of water and hexadecane in an isothermal turbulent jet of air. The results indicated that an initial radial velocity fluctuation in the droplet motion at the jet exit can serve to increase significantly the dispersion of droplets larger than 100 microns. Vortex dynamics simulations of the near region of the jet showed that Basset, virtual mass and pressure gradient forces may be neglected for small droplets but may need to be accounted for, particularly at high pressure, with large droplets (> 100 microns) even if the drop to gas density ratio is close to one. A stochastic simulation of particle dispersion revealed that the Reynolds stresses or velocity correlations in this flow do not contribute significantly to particle dispersion. Keywords: Turbulent shear flows, Particle dispersion, Vortex dynamics, Stochastic simulation. (jhd)

DESCRIPTORS: (U) *DISPERSING, *SHEAR PROPERTIES, *TURBULENT FLOW, CORRELATION, DENSITY, DROPS, GASES, HEXADECANE, HIGH PRESSURE, LASERS, LIGHT SCATTERING, MOMENTUM TRANSFER, MOTION, NUMERICAL ANALYSIS, PARTICLES, RADIAL VELOCITY, RATIOS, SIMULATION, STOCHASTIC PROCESSES, STRESSES, VARIATIONS, VELOCITY, VORTICES, WATER.

AD-A224 327 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A224 293 20/5

PITTSBURGH UNIV PA DEPT OF CHEMISTRY

(U) Direct Observation of Adsorbate-Adsorbate Repulsions Along a One-Dimensional Array: CO on the Steps of Pt(112).

APR 90 7P

PERSONAL AUTHORS: Henderson, M. A.; Szabo, A.; Yates, J. T., Jr

CONTRACT NO. AFOSR-82-0133

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-90-0758

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v168 n1 p51-55, 20 Apr 90.

ABSTRACT: (U) The orientation of CO on the steps of Pt(112) (Pt(S)(3(111)x(001))) was studied by digital electron stimulated desorption - ion angular distribution (ESDIAD), monitoring the z-3-Pi-CO state. At low coverages, CO is adsorbed exclusively on step sites. At higher coverages, one - dimensional CO-CO repulsions result in tilting along the steps. When the steps are filled, all step CO molecules reorient orthogonally with new tilt angles up and down the steps. The selection of orthogonal tilt directions at various coverages has not been observed previously. These CO tilting effects are primarily due to steric repulsions rather than static dipole - dipole interactions. Keywords: Carbon monoxide, Platinum, Chemisorption, Steric effects, Electronic stimulated desorption. (JES)

DESCRIPTORS: (U) *DESORPTION, *DIGITAL SYSTEMS, *DIPOLES, ANGLES, ARRAYS, CARBON MONOXIDE, CHEMISORPTION, DISTRIBUTION, ELECTRONS, INTERACTIONS, IONS, ONE DIMENSIONAL, ORIENTATION(DIRECTION), ORTHOGONALITY, SITES, STIMULATION(GENERAL), TILT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD-A224 293

AD-A224 285 11/6

ROCKWELL INTERNATIONAL THOUSAND OAKS CA

(U) Processability and High Temperature Behavior of Emerging Aerospace Alloys.

DESCRIPTIVE NOTE: Final rept. 1 May 86-28 Feb 90,

JUN 90 102P

PERSONAL AUTHORS: Ghandhi, C.; Ghosh, A. K.; Rhodes, C. G.

REPORT NO. SC5459.FR

CONTRACT NO. F49620-86-C-0058

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-90-0745

UNCLASSIFIED REPORT

ABSTRACT: (U) In Part 1, a model for subgrain superplasticity has been developed. Aluminum alloys that contain low angle boundaries exhibit different superplastic behavior than alloys consisting of high angle boundaries. On a relative basis, the low angle boundaries increase the flow stress but impart a greater resistance to cavitation; the strain-rate sensitivity of this material is generally smaller and the change in the strain-rate sensitivity with strainrate shows a minimum instead of a maximum as observed in the large angle boundary materials. As a result, the subgrain material can be deformed to a large tensile strains at fast strain rates. A kinetic model for subgrain superplasticity that invokes a balance between the arrival and emission rates of disclosure at low angle boundaries is presented. It explains several features of subgrain superplasticity. It also explains why ultrafine dispersoids of intermetallics appear to stabilize the subgrain structure in aluminum. Early work on the correlation between flow stress and subgrain size in dynamic recrystallization of metals may also be consistent with the model. (JES)

DESCRIPTORS: (U) *ALUMINUM ALLOYS, AEROSPACE SYSTEMS, ALLOYS, ALUMINUM, ANGLES, BEHAVIOR, BOUNDARIES,

AD-A224 285

AD-A224 285 CONTINUED

CAVITATION, DYNAMICS, EMISSION, FLOW, GRAIN BOUNDARIES, HIGH ANGLES, HIGH RATE, HIGH TEMPERATURE, KINETICS, LOW ANGLES, MATERIALS, METALS, MODELS, RATES, RECRYSTALLIZATION, RESISTANCE, SENSITIVITY, SIZES(DIMENSIONS), STRAIN RATE, STRESSES, SUPERPLASTICITY, TENSILE STRESS.

IDENTIFIERS: (U) WUAFOSR2306A1, PE61102F.

AD-A224 284 12/5

HONEYWELL SYSTEMS AND RESEARCH CENTER BLOOMINGTON MN

(U) Optical Symbolic Processor for Expert System Execution.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 86-31 Dec 89,

DEC 89 248P

PERSONAL AUTHORS: Bristow, Julian

CONTRACT NO. F49620-86-C-0082, ARPA Order-5794

MONITOR: AFOSR
TR-90-0744

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this program was to develop key concepts for optical symbolic computing. During the course of the program, both a top-down and bottom-up approach was taken to develop an architecture for symbolic computing. The approach was intended to result in an architecture suitable for the design goals while being implementable with practical components. Key results of the program include the following: Design of a unique symbolic processing architecture, Identification of lack of suitable addressable optical memory as a major impediment in the implementation of existing paradigms, Demonstration of a unique, critically needed polarization based modulator with 17 dB extinction ratio, and demonstration of the world's highest extinction ratio (23 dB) of AlGaAs/GaAs modulator at 1 GHz, and Demonstration of high density modulator arrays with the world's smallest pitch (20 um) and less than 20 dB crosstalk. (rh)

DESCRIPTORS: (U) , ADDRESSING, ARRAYS, COMPUTATIONS, COMPUTER ARCHITECTURE, COMPUTER PROGRAMS, EXTINCTION, GALLIUM ARSENIDES, GLOBAL, HIGH DENSITY, MEMORY DEVICES, MODELS, MODULATORS, OPTICAL PROCESSING, OPTICAL STORAGE, POLARIZATION, RATIOS, SYMBOLS.

AD-A224 282 20/9 20/5

CALIFORNIA UNIV IRVINE DEPT OF PHYSICS

(U) Anomalous Decay of Langmuir Turbulence. High Power, High Frequency Radiation from Beam-Plasma Interactions.

DESCRIPTIVE NOTE: Final rept. 15 Nov 87-29 Jun 90,

JUN 90 19P

PERSONAL AUTHORS: Benford, Gregory

CONTRACT NO. AFOSR-87-0217

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-90-0781

UNCLASSIFIED REPORT

ABSTRACT: (U) A new Stark effect diagnostic was used to measure the E-field distribution of Langmuir waves in beam-plasma turbulence. Abrupt beam cut off causes the distribution's amplitude to decay exponentially in a microsecond, in disagreement with recent power law scalings deduced from cascade theory. (jhd)

DESCRIPTORS: (U) *PLASMAS(PHYSICS), *TURBULENCE, *ELECTRON BEAMS, AMPLITUDE, ANOMALIES, DECAY, DISTRIBUTION, ELECTRIC FIELDS, HIGH FREQUENCY, HIGH POWER, INTERACTIONS, LANGMUIR PROBES, POWER, RADIATION, STARK EFFECT.

IDENTIFIERS: (U) WUAFOSR2301A8, PE61102F, Langmuir waves.

AD-A224 281 21/2 7/3

PRINCETON UNIV NJ

(U) Chemical Kinetic and Aerodynamic Structures of Flames.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 89-28 Feb 90,

JUN 90 27P

PERSONAL AUTHORS: Law, C. K.

CONTRACT NO. AFOSR-89-0293

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-90-0748

UNCLASSIFIED REPORT

ABSTRACT: (U) During the reporting period extensive experimental and numerical studies on the dynamics and kinetics of laminar premixed and diffusion flames have been conducted. Specific problems investigated include dilution and temperature effects in soot formation in diffusion flames, chemical and physical effects of additives in soot formation, experimental determination of laminar flame speeds of ethane, ethylene, acetylene, propane and hydrogen mixtures with air and the partial validation of the associated kinetic mechanisms, the theoretical prediction and experimental determination of the flammability limits of a variety of combustible mixtures, and the determination of the dynamic and chemical kinetic structures of diffusion flames near extinction. Keywords: Flame dynamics, Flame kinetics, Turbulent flames, Soot formation, Flammability limits. (jhd)

DESCRIPTORS: (U) *FLAMES, *REACTION KINETICS, *SOOT, ACETYLENE, ADDITIVES, AERODYNAMIC CONFIGURATIONS, CHEMICAL PROPERTIES, CHEMICAL REACTIONS, COMBUSTION, DIFFUSION, DYNAMICS, ETHANES, ETHYLENE, EXPERIMENTAL DATA, FLAMMABILITY, HYDROGEN, LAMINAR FLOW, LIMITATIONS, MATHEMATICAL PREDICTION, MIXING, MIXTURES, MOLECULAR STRUCTURE, NUMERICAL ANALYSIS, PHYSICAL PROPERTIES, PROPANE, STRUCTURES, TEMPERATURE, TURBULENCE, VALIDATION, VELOCITY.

AD-A224 281 CONTINUED

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F.

AD-A224 236 5/8

CALIFORNIA UNIV BERKELEY DEPT OF PSYCHOLOGY

(U) Norms and Perception of Events.

DESCRIPTIVE NOTE: Annual technical rept. no 2, 1 Jul 89-15 Jun 90,

JUN 90 36P

PERSONAL AUTHORS: Kahnemán, Daniel

CONTRACT NO. AFOSR-89-0206

MONITOR: AFOSR
TR-90-0760

UNCLASSIFIED REPORT

ABSTRACT: (U) In the second year of the grant I continued three projects initiated in the first year, and began two new lines of research. A study of contingent coding in normality judgements yielded disappointing results. We started a systematic exploration of the relation between discriminability and similarity, which we plan to extend to categorization and normality. A series of studies established essentially perfect dimensional independence in object-specific priming. We conducted a theoretical and empirical examination of close counterfactuals. Two separate projects dealt with the process of comparison, continuing and extending work reported last year. Keywords: Perception, (Psychology), Categorization, Comparison processes, Normality. (SDW)

DESCRIPTORS: (U) *NORMALITY, *PERCEPTION(PSYCHOLOGY), CODING, COMPARISON, JUDGEMENT(PSYCHOLOGY), NUMERICAL ANALYSIS.

IDENTIFIERS: (U) WUAFOSR23134A, PE61102F.

AD-A224 227 6/5

INSTITUTE FOR CIRCADIAN PHYSIOLOGY BOSTON MA

(U) Pharmacological Resetting of the Circadian Sleep-Wake Cycle Effects of Triazolam on Reentrainment of Circadian Rhythms in a Diurnal Primate.

DESCRIPTIVE NOTE: Final technical rept. 1 May-31 Oct 90,

JUN 90 12P

PERSONAL AUTHORS: Boulos, Z.; Moore-Ede, M. C.

CONTRACT NO. AFOSR-88-0191

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-90-0755

UNCLASSIFIED REPORT

ABSTRACT: (U) An attempt was made to accelerate the reentrainment of circadian rhythms in squirrel monkeys exposed to 8-hr phase advances and phase delays of the daily light-dark cycle by timed administration of the short-acting benzodiazepine, triazolam. On the day of the phase advance, each animal received a single injection of triazolam (0.3 mg) or of vehicle alone in mid-subjective day, 2 hr after the new time of dark onset, while on the day of the phase delay, the animals received triazolam or vehicle in late subjective night, just before dark onset. The daily acrophases of the circadian rhythm of body temperature were calculated by cosinor analysis, and exponential functions were fitted to the acrophases that followed each of the phase shifts. The rates of reentrainment, defined as the time required for the exponential functions to reach 90% of their asymptotic values, were slower after the phase advance than after the phase delay but did not differ significantly between drug and vehicle conditions. Keywords: Circadian rhythms, Entrainment, Body Temperature, Phase shift, Benzodiazepines, Triazolam. (JES)

DESCRIPTORS: (U) *CIRCADIAN RHYTHMS, ANIMALS, BODY TEMPERATURE, DAY, DELAY, DIURNAL VARIATIONS, EXPONENTIAL FUNCTIONS, NIGHT, PHASE SHIFT, PRIMATES, SQUIRREL MONKEYS,

AD-A224 227 CONTINUED

TIME, VEHICLES.

IDENTIFIERS: (U) WUAFOSR2312A2, PE61102F.

AD-A224 147 6/4

LOYOLA UNIV OF CHICAGO IL PARMLY HEARING INST

(U) Auditory Processing of Complex Sounds.

DESCRIPTIVE NOTE: Annual rept. 1 May 89-30 Apr 90,

MAY 90 7P

PERSONAL AUTHORS: Shofner, William P.

CONTRACT NO. AFOSR-89-0335

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR
TR-90-0754

UNCLASSIFIED REPORT

ABSTRACT: (U) Neurophysiological experiments have been directed at gaining an understanding of how auditory neurons encode pitch related information in the temporal properties of discharge. In general, all physiological neuronal types recorded to date in the chinchilla cochlear nuclea can show periodicities in their discharges that are related to the pitch of harmonic tone complexes, but only those neurons that show phase-locking at best frequency can encode the pitch related information in cost + rippled noise. The results of binaural psychophysical experiments suggest (1) that spectrally synthetic binaural processing is the rule when the number of components in the tone complex are relatively few (less than 10) and there are no dynamic binaural cues to aid segregation of the target from the background, and (2) that waveforms having large effective envelope depths are on the average more easily lateralized than those having small effective envelope depths. (jhd)

DESCRIPTORS: (U) *HEARING, *NEUROPHYSIOLOGY, *PSYCHOPHYSICS, *AUDITORY PERCEPTION, AUDITORY SIGNALS, NERVE CELLS, SIGNAL PROCESSING, SOUND, SPECTRA, TEST METHODS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A6, Chinchilla Cochlear nuclea.

AD-A224 147

AD-A224 128 20/11

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(U) Interface Formation and Percusory Dynamics.

DESCRIPTIVE NOTE: Final rept. 15 Nov 86-14 Feb 90,

MAY 90 6P

PERSONAL AUTHORS: Joannopoulos, John D.

CONTRACT NO. AFOSR-87-0098

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR
TR-90-0751

UNCLASSIFIED REPORT

ABSTRACT: (U) A completely ab-initio investigation of grain boundaries in solids has been performed for the first time. The electronic and structural properties of two short-period twist boundaries in Ge have been explored and found to be extremely complex. Boundary bonds are found to be distorted and weak, three-fold and five-fold coordinated defects appear to exist, and topological disorder in the form of odd and even numbers of rings of bonds is found to prevail. Complete total energy surfaces as a function of displacement of one grain over the other have also been mapped out. The results predict that there is a large degeneracy in the number of local energy minima, that tunneling-like modes should exist in these boundaries, that the formation energies of the boundaries lie in the range between 4 and 7 eV per unit cell, that the boundary volumes involve expansions in the range of 0.1 to 0.3 A/unit area, that trends toward dimerization exist parallel to the boundary planes, that electronic states will exist deep in the fundamental gaps of these systems. (JES)

DESCRIPTORS: (U) *DYNAMICS, *TWIST(MOTION), BONDING, BOUNDARIES, CELLS, DIMERS, ELECTRONIC STATES, ELECTRONICS, ENERGY, GRAIN BOUNDARIES, INTERFACES, ORDER DISORDER TRANSFORMATIONS, RINGS, SHORT RANGE(TIME), SOLIDS, STRUCTURAL PROPERTIES, SURFACES, TOPOLOGY, VOLUME.

AD-A224 128

AD-A224 128 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

AD-A224 127 25/4 20/1

FLORIDA UNIV GAINESVILLE DEPT OF PSYCHOLOGY

(U) Complex Auditory Signals.

DESCRIPTIVE NOTE: Annual rept. 14 Apr 89-15 Apr 90,

JUN 90 7P

PERSONAL AUTHORS: Green, David M.; Berg, Bruce G.

CONTRACT NO. AFOSR-88-0333

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR
TR-90-0749

UNCLASSIFIED REPORT

ABSTRACT: (U) Efforts to understand the perception of complex auditory stimuli produced four different research undertakings. Studies have been done both with computer simulations and human listeners, the most precise psychophysical procedure to estimate a discrimination threshold. A technique to determine the listener's sensitivity to synchrony was perfected in envelope modulation produced at two separate regions, and have measured such sensitivity using a variety of different stimulus parameters. Sensitivity to modulation synchrony is essentially independent of the locus of the two frequency bands. Studies have also been done on temporal factors that influence the ability to discriminate an increment in the level of a single component of a multi-tonal complex. Very slight differences in the temporal onset (>20 msec.) of tone and complex strongly influence the ability to make such discrimination even when the entire stimulus lasts 500 msec. Finally, we continue to study the estimates of spectral weights used in such intensity discrimination tasks, using the COSS analysis. Keywords: Psychoacoustics. (CP)

DESCRIPTORS: (U) *AUDITORY SIGNALS, *AUDITORY PERCEPTION, *PSYCHOACOUSTICS, *STIMULI, COMPUTERIZED SIMULATION, DISCRIMINATE ANALYSIS, ENVELOPE(SPACE), ESTIMATES, HEARING, INTENSITY, MODULATION, PARAMETERS, PERCEPTION, PSYCHOPHYSICS, SENSITIVITY, SPECTRA, THRESHOLD EFFECTS.

AD-A224 127 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A6.

AD-A224 126 1/3 12/1 1/1

BOSTON UNIV MA COLL OF ENGINEERING

(U) Analysis of Dynamic Transient Response and Postflutter Behavior of Super-Maneuvering Airplane.

DESCRIPTIVE NOTE: Final rept. 15 Apr 87-14 Aug 88,

AUG 88 69P

PERSONAL AUTHORS: Morino, Luigi; Sipcic, Slobodan R.

CONTRACT NO. F49620-86-C-0040

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-90-0747

UNCLASSIFIED REPORT

ABSTRACT: (U) A general geometrically-exact Lagrangian mechanics formulation for the aeroelastic analysis of a maneuvering aircraft has been presented. The motion of the aircraft is expressed in terms of the location of the origin of a body frame of reference, the rigid-body rotation of the body frame of reference, and a deformation. The Lagrangian equations of motion for the corresponding degrees of freedom have been obtained. A formulation has been specialized to the case of a fluttering buckled plate on an aircraft undergoing a pitching maneuver. Assuming that the maneuvering of the aircraft is prescribed, the Lagrange equations of motion for the elastic degree of freedom has been derived. This equation is then used to study the response of the panel of an aircraft engaged in a pull-up maneuver. The large-amplitude responses are investigated by using the digital computer. As the maneuvering (load-factor) increases, system exhibits complicated dynamic behavior including period-multiplying and demultiplying bifurcations and chaos. Keywords: Aircraft; Dynamic response; Lagranian functions; Bifurcation(Mathematics); Maneuverability. (cp)

DESCRIPTORS: (U) *AERODYNAMIC LOADING, *AEROELASTICITY, *AIRCRAFT, *DYNAMIC RESPONSE, *FLIGHT MANEUVERS, DEFORMATION, ELASTIC PROPERTIES, EQUATIONS, EQUATIONS OF MOTION, LAGRANGIAN FUNCTIONS, MANEUVERABILITY, PANELS,

AD-A224 126 CONTINUED

TRANSIENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1, Bifurcation theory.

AD-A224 121 6/5

BAYLOR COLL OF MEDICINE HOUSTON TX

(U) Heterosynaptic Modulation of Long-Term Potentiation at Mossy Fiber Synapses in Hippocampus.

DESCRIPTIVE NOTE: Annual technical rept. 1 Apr 89-31 Mar 90,

JUN 90 16P

PERSONAL AUTHORS: Johnston, Daniel

CONTRACT NO. AFOSR-88-0142

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-90-0750

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall goal of this research project is to investigate the cellular and membrane mechanisms associated with the heterosynaptic modulation of long-term synaptic potentiation (LTP) at mossy fiber synapses in the hippocampus. We have previously shown that norepinephrine, through beta-adrenoceptors, enhances the magnitude, duration, and probability of induction of mossy fiber LTP, while acetylcholine, through muscarinic receptors, depresses the magnitude and probability of induction of mossy fiber LTP. The goal for the second year of this research project was to test several specific hypotheses for the induction of mossy fiber LTP. Specifically, the hypotheses relate to the possible requirement of postsynaptic calcium entry through voltage-gated calcium channels during the induction LTP. Moreover, we have been investigating the properties and distribution of voltage-gated calcium channels in hippocampal neurons and the modulation of these calcium channels by noradrenergic and cholinergic agonists. In a collaborative project with Dr. David Terrian, originally at the USAFSAM in San Antonio and now at East Carolina University, the mechanisms of neurotransmitter release from a homogeneous fraction of mossy fiber synaptosomes have been investigated. Keywords: Long-term potentiation, Noreinephrine, Acetylcholine, Synaptic plasticity,

AD-A224 121 CONTINUED

Voltage clamp, Patch clamp, Calcium channels, Hippocampus, Mossy fiber. (JES)

DESCRIPTORS: (U) *MEDICINE, *NERVE TRANSMISSION, ACETYLCHOLINE, CALCIUM, CHANNELS, CLAMPS, CYTOLOGY, HIPPOCAMPUS, HYPOTHESES, LONG RANGE(TIME), MEMBRANES, MUSCARINE, NERVE CELLS, NOREPINEPHRINE, PLASTIC PROPERTIES, RECEPTION, RELEASE, SYNAPSE, VOLTAGE.

IDENTIFIERS: (U) WUAFOSR2312A2, PE61102F.

AD-A224 112 7/3

FLORIDA UNIV GAINESVILLE

(U) Photoelectron Spectroscopic and Theoretical Study of Ketene Imine, CH2=C=NH, and Ketene N-methylimine, CH2=C=NCH3,

90 7P

PERSONAL AUTHORS: Kroto, Harold W.; Matti, George Y.; Suffolk, Roger J.; Watts, John D.; Rittby, Magnus

CONTRACT NO. AFOSR-89-0207

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-90-0756

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical Society v112 p3779-3784, 1990.

ABSTRACT: (U) The organic transient molecule ketene imine, CH2CNH, which may be important to the chemistry of the interstellar medium, has been produced by thermolysis of 3-hydroxypropionitrile, HOCH2CH2CN, and its He I photoelectron spectrum obtained for the first time. The interpretation of the spectrum is assisted by the calculation of the lowest four vertical ionization energies by a recently developed ab initio multireference coupled-cluster method (MRCC) and the SCF calculation of the vibrational frequencies of the lowest two cationic states. The lowest three observed ionization energies are 9.28, 11.91, and 13.04 eV. A fourth ionization is observed in the range 15-16 eV, but precise measurement is not possible because of contamination of this region of the spectrum by formaldehyde. The MRCC calculations predict ionization energies of 9.18 (a'), 12.03 (a), 13. 17 (a'), and 15.68 (a) eV. Additional experimental and MRCC results for ketene N-methylimine, CH2CNCH3 provide further confirmation of the assignments for ketene imine. (jes)

DESCRIPTORS: (U) *ORGANIC CHEMISTRY, COMPUTATIONS, CONTAMINATION, ENERGY, FORMALDEHYDE, FREQUENCY,

AD-A224 112 CONTINUED

INTERSTELLAR MATTER, IONIZATION, MEASUREMENT, PHOTOELECTRONS, PRECISION, SPECTRA, SPECTROSCOPY, VERTICAL ORIENTATION, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A224 111 7/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES LOKER HYDROCARBON RESEARCH INST

(U) Anionic Ring Opening Polymerization of 1-Silacyclopent-3-ene. Characterization Poly(1-sila-cis-pent-3-ene) by 1H, 13C, and 29Si NMR Spectroscopy,

90 7P

PERSONAL AUTHORS: Zhou, Stephen Q.; Park, Young T.; Manuel, Georges; Weber, William P.

CONTRACT NO. AFOSR-89-0007

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-90-0757

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer Bulletin v23 p491-496, 1990.

ABSTRACT: (U) While polymethylhydrosiloxanes are well known, other polymers which possess reactive Si-H bonds such as polycarbosilanes are less common. The proposal that poly(methylsilylene)methylene)(-CH3SiH-CH2-)n is an intermediate in the conversion of poly(dimethylsilane)(-CH3)2Si-)n fibers to silicon carbide fibers has increased interest in these systems. Keywords: 1-Silacyclopent-3-ene; Poly(1-sila-cis-pent-3-ene); Preceramic polymer; Anionic ring opening polymerization. (jes)

DESCRIPTORS: (U) *ORGANIC MATERIALS, ANIONS, FIBERS, OPENING(PROCESS), POLYMERIZATION, POLYMERS, RINGS, SILICON CARBIDES, SPECTROSCOPY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A224 091 9/3 12/1

HAMPTON UNIV VA DEPT OF PHYSICS

(U) Center for Electro Optics & Plasma Research.

DESCRIPTIVE NOTE: Final technical rept. Oct 86-Dec 89,

APR 90 141P

PERSONAL AUTHORS: Ve able, D. D.; Han, K. S.; Lee, J. H.; Kim, J. K.; Lee, S. M.

CONTRACT NO. AFOSR-86-0345

PROJECT NO. 3484

TASK NO. A6

MONITOR: AFOSR
TR-90-0674

UNCLASSIFIED REPORT

ABSTRACT: (U) A 1-Hz hypocycloidal pinch (HCP) pumped laser was operated at 1 kJ input energy. The time integrated continuum spectrum of the pump light approximated that of a 15,000 K blackbody for the wavelength range above 250 nm. The pump emission was found to be stable at 1 Hz operation. The overall efficiency of the system was found to be 0.01% for single shot operation of pumping blue-green and near ultraviolet (uv) dye lasers 2 MW, but the laser output saturated with the input energy 4 kJ due to thermal lensing effects in the dye. Thermal effects introduced by nonuniform heating of the dye solution resulted in a reduction of the uv laser output as repetition rates increased. The thermal effects were significantly reduced by using a double walled dye cuvette. A theoretical model was developed to describe the electromagnetic acceleration of the plasma produced in the HCP device. The computer model described the operation of the device in the snow-plow mode and took into account the unique geometry and electrical parameters of the HCP devices used in the laboratory. Keywords: Ultraviolet lasers; Electrooptics; Equations of motion. (cp)

DESCRIPTORS: (U) *ELECTROOPTICS, *PLASMAS(PHYSICS), *ULTRAVIOLET LASERS, ACCELERATION, COMPUTERIZED SIMULATION, DYE LASERS, EFFICIENCY, ELECTRICAL PROPERTIES,

AD-A224 091 CONTINUED

ELECTROMAGNETISM, EMISSION, ENERGY, EQUATIONS OF MOTION, FREQUENCY, HEATING, INPUT, INTEGRATED SYSTEMS, LASERS, MODELS, NEAR ULTRAVIOLET RADIATION, NONUNIFORM, OPERATION, PARAMETERS, PUMPING, PUMPING(ELECTRONICS), REPETITION RATE, SPECTRA, THEORY, THERMAL LENS EFFECT, THERMAL PROPERTIES, TIME.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A6, HCP(HypoCycloidal Pinch), Blue green lasers.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A224 022 6/11

ARKANSAS UNIV FOR MEDICAL SCIENCES LITTLE ROCK

(U) Mechanisms of Halocarbon-Induced Hepatotoxicity in the Mouse.

DESCRIPTIVE NOTE: Final rept. 1 Apr 89-31 Mar 90,

MAY 90 73P

PERSONAL AUTHORS: Smith, Mary A.; Gandy, Jay

CONTRACT NO. AFOSR-89-0344

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-90-0684

UNCLASSIFIED REPORT

ABSTRACT: (U) Previous studies have shown that high-dose exposure to the halocarbon bromobenzene resulted in hepatotoxicity and lethality that was substantially diminished by co-treatment with the alpha-adrenergic antagonist, phentolamine. The purpose of this study was to compare the hepatoxicity resulting from exposure to the related halocarbons, chlorobenzene, bromobenzene and iodobenzene, and to determine whether the resulting hepatotoxicity could be antagonized by phentolamine. Halobenzene-induced changes in hepatic glutathione concentrations and serum concentrations of catecholamines were determined as possible mediators of hepatic damage. Iodobenzene administration resulted in toxicities similar to that seen with bromobenzene. Administration of either iodobenzene or bromobenzene resulted in hepatotoxicity as measured by serum alanine aminotransferase (ALT) activity about 1000 fold above normal values. Chlorobenzene was also capable of producing hepatotoxicity, but not to the same extent as iodobenzene. Chlorobenzene-induced hepatotoxicity resulted in serum ALT values approximately 100 fold above normals. Chlorobenzene, bromobenzene or iodobenzene administration significantly decreased hepatic glutathione concentrations to approximately 20% of control concentrations. Phentolamine co-treatments significantly decreased serum ALT activity for all three compounds suggesting that hepatotoxicity might be

AD-A224 022 CONTINUED

mediated through an alpha-adrenergic system.

DESCRIPTORS: (U) *LIVER, *TOXIC AGENTS, ALANINES, AMINOTRANSFERASES, BLOOD SERUM, CHLOROBENZENE, HALOGENATED HYDROCARBONS, HEPATITIS, LETHALITY, MICE, TOXICITY, VALUE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

AD-A224 017 20/5

PITTSBURGH UNIV PA DEPT OF CHEMISTRY

(U) Spectroscopic Studies of the Products of the Reactions of Electronically Excited Atoms and Small Molecules.

DESCRIPTIVE NOTE: Final rept. 15 Apr 86-14 Apr 90,

JUN 90 42P

PERSONAL AUTHORS: Golde, Michael F.

REPORT NO. FQ8671-8700986

CONTRACT NO. AFOSR-86-0123

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-90-0731

UNCLASSIFIED REPORT

ABSTRACT: (U) Reactions of the electronically-excited species, N2(A 3 Sigma(+) sub u, v), with selected molecules have been studied via measurement of the dependence of the rate constant on vibrational quantum number, v, determination of the products of electronic quenching, and measurement of vibrational distributions in product fragments of dissociation channels, using laser induced fluorescence and atomic resonance fluorescence in discharge flow systems. Similar investigations of key reactions of electronically excited CO, Ar, Kr and Xe have also been undertaken. The rate constants for several inefficient quenchers are greatly enhanced by vibration in (N sub 2)(A). An empirical correlation shown by these data is consistent with quenching via near-vertical transitions in the N sub 2 and in electronic excitation of the reagent molecule, generally to a dissociative state. Keywords: Energy transfer; Laser induced fluorescence; Molecules; Molecular spectroscopy. (cp)

DESCRIPTORS: (U) *ATOMS, *MOLECULAR SPECTROSCOPY, *MOLECULES, *QUENCHING, CHEMICAL AGENTS, CORRELATION, ELECTRONIC STATES, DISTRIBUTION, ELECTRONS, ENERGY TRANSFER, EXCITATION, FLOW, FLUORESCENCE, FRAGMENTS,

AD-A224 017 CONTINUED

LASER INDUCED FLUORESCENCE, MEASUREMENT, NUCLEAR RESONANCE, QUANTUM THEORY, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, Atomic resonance fluorescence.

AD-A223 988 6/3

BIOPHYSICAL SOCIETY BETHESDA MD

(U) International Biophysics Congress (8th) Held in Bristol, United Kingdom on 29 July-4 August 1984. Final Programme and Book of Abstracts,

FEB 86 335P

PERSONAL AUTHORS: Peachey, Lee D.

CONTRACT NO. AFOSR-84-0110

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR
TR-90-0742

UNCLASSIFIED REPORT

ABSTRACT: (U) The scientific programme comprised four plenary lectures, twenty-eight symposia with invited speakers and oral presentations. Session topics included: Chemical and electrical regulation of ion channels; NMR in vivo; Polymorphism and structural transitions in nucleic acids; Food biophysics; Nucleic acid-protein interactions; Processing and control of visual information; Connective tissue and bone; Mechanisms of transport across membranes; Cytoskeleton; Chromatin structure and function; Structure of food biopolymers; Cross-bridge mechanisms and muscle contraction; Education in biophysics; Viruses; Folding, dynamics and solvation of macromolecules; Image reconstruction; Dissipative structures and pattern formation in biological systems; Photosynthesis; Medical imaging; Molecular evolution; Metal-proteins and electron transfer; Polysaccharides and glycoproteins; Electrostatic effects in protein function; Photo and auditory receptors; Applications of synchrotron radiation; Rheology of cell membrane; Electric field effects in cell membranes; Developments in microscopy; Environmental biophysics. This volume consists of abstracts of each days scientific contributions. (edc)

DESCRIPTORS: (U) *BIOPHYSICS, *CELLS(BIOLOGY), *SYMPOSIA, ABSTRACTS, BIOCHEMISTRY, BIOLOGY, BONES, CELL STRUCTURE, CHANNELS, CHEMICAL PROPERTIES, CHROMATIN, CONNECTIVE TISSUE, CONTRACTION, CONTROL, DATA PROCESSING,

AD-A223 988 CONTINUED

DISSIPATION, DYNAMICS, ELECTRIC FIELDS, ELECTRICAL PROPERTIES, ELECTRON TRANSFER, ELECTROSTATICS, ENVIRONMENTS, EVOLUTION(BIOLOGY), FIBERS, FOOD, FUNCTIONS, GLYCOPROTEINS, IN VIVO ANALYSIS, INTERNATIONAL, IONS, LECTURES, MACROMOLECULES, MEDICAL SERVICES, MEMBRANES(BIOLOGY), MICROSCOPY, MOLECULES, MUSCLES, NUCLEAR MAGNETIC RESONANCE, NUCLEIC ACIDS, OPTICAL DATA, PATTERNS, PHOTOSYNTHESIS, POLYMORPHISM, POLYSACCHARIDES, PROTEINS, RADIOGRAPHY, RHEOLOGY, SOLVATION, STRUCTURAL PROPERTIES, SYNCHROTRON RADIATION, TRANSITIONS, TRANSPORT, VIRUSES, VISION, X RAYS.

IDENTIFIERS: (U) Cytoskeleton, PE61102F, WUAFOSR2312A3.

AD-A223 886 9/1

HOWARD UNIV WASHINGTON DC DEPT OF ELECTRICAL ENGINEERING

(U) Development of Short Gate Fet's.

DESCRIPTIVE NOTE: Rept. for 1 Jul 84-30 Jun 85,

JUN 85 48P

PERSONAL AUTHORS: Spencer, Michael G.

CONTRACT NO. AFOSR-84-0201

MONITOR: AFOSR
TR-90-0813

UNCLASSIFIED REPORT

ABSTRACT: (U) This project investigated the possibilities of improved performance in the standard GaAs field effect transistor structures. A secondary objective was to determine the extent to which Deep UV Lithography could be used as a technique to produce high resolution geometries. One can now routinely produce .5 micron gate geometries with Deep UV lithography and occasionally sub .25 micron structures. This technology is used to produce devices with state of the art electrical characteristics. Into the last term of the contract A novel structure will be used to try and increase the output conductance of these devices. The annealing of undoped epitaxial material will also be investigated. (rh)

DESCRIPTORS: (U) , ANNEALING, CONDUCTIVITY, ELECTRICAL PROPERTIES, EPITAXIAL GROWTH, GATES(CIRCUITS), HIGH RESOLUTION, LITHOGRAPHY, MATERIALS, OUTPUT, SHORT RANGE(TIME), ULTRAVIOLET RADIATION.

AD-A223 886

AD-A223 776 20/4

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS

(U) An Investigation of the Inviscid Spatial Instability of Compressible Mixing Layers.

DESCRIPTIVE NOTE: Master's thesis,

MAY 90 144P

PERSONAL AUTHORS: Zhuang, Mei

CONTRACT NO. AFOSR-88-0155

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-90-0762

UNCLASSIFIED REPORT

ABSTRACT: (U) This dissertation investigates the behavior of both unbounded and bounded compressible plane mixing layers with respect to two- and three-dimensional, spatially growing wave disturbances using linear stability analysis. The mixing layer is formed by two parallel streams with different gases and the flow is assumed to be inviscid and non-reacting. For unbounded mixing layers, the effects of the free-stream Mach number, velocity ratio, temperature ratio, gas constant (molecular weight) ratio and the ratios of specific heats on the linear spatial instability characteristics of a mixing layer are determined. A nearly universal dependence of the normalized maximum amplification rate on the convective Mach number is found for two-dimensional spatially growing disturbances. The effects of the mean flow profiles on the instability behavior of the mixing layers are also studied. It is shown that decreasing the thickness of the total temperature profile relative to the mean velocity profile, or adding a wake component in the mean velocity profile can make the normalized amplification rate decrease slower as the convective Mach number increases for both subsonic and supersonic convective Mach numbers. For an unbounded mixing layer with subsonic convective Mach numbers, there is only one unstable mode propagating with a phase

AD-A223 776

AD-A223 776 CONTINUED

velocity C* sub pm approx. = to the isentropically estimated convective velocity of the large scale structures u* sub c. As the convective Mach number approaches or exceeds unity, there are always two unstable spatial modes. (edc)

DESCRIPTORS: (U) *COMPRESSIBLE FLOW, *GAS FLOW, *MIXING, AMPLIFICATION, COMPRESSIVE PROPERTIES, CONVECTION, ESTIMATES, FREE STREAM, GASES, INVISCID FLOW, LAYERS, LINEAR SYSTEMS, MACH NUMBER, MEAN, MOLECULAR WEIGHT, PARALLEL ORIENTATION, PHASE, PROFILES, RATES, RATIOS, SPATIAL DISTRIBUTION, SPECIFIC HEAT, STABILITY, SUBSONIC FLOW, SUPERSONIC FLOW, TEMPERATURE, THESES, THICKNESS, TWO DIMENSIONAL FLOW, THREE DIMENSIONAL FLOW, VELOCITY, WAKE, WAVES.

IDENTIFIERS: (U) Instability. Linear stability analysis, *Mixing layers, Mixing flow, PE61102F, WUAFOSR2308A2.

AD-A223 769 12/3

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) On Partially Observable Markov Decision Processes with an Average Cost Criterion,

DEC 89 7P

PERSONAL AUTHORS: Fernandex-Gaucherand, Emmanual; Arapostathis, Aristotle; Marcus, Steven I.

CONTRACT NO. AFOSR-86-0029

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-90-0716

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Conference on Decision and Control, IEEE (28th) p1267-1272 Dec 89.

ABSTRACT: (U) We consider partially observable Markov decision processes with finite or countable (core) state and observation spaces and finite control space. Following a standard approach, an equivalent completely observed problem is formulated, with the same finite control space but with an uncountable state space, namely the space of probability distributions on the original core state space. It is observed that some characteristics induced in the original problem due to the finiteness, or countability, of the spaces involved are reflected onto the equivalent problem. Sufficient conditions are then derived for a bounded solution to the average cost optimality equation to exist. We illustrate these results in the context of machine replacement problems. Structural properties for average cost policies are obtained for a two state replacement problem, similar to available results for discount optimal policies. The set of assumptions used seems to be significantly less restrictive than others currently available. Keywords: Reprints. (kr)

DESCRIPTORS: (U) *DECISION MAKING, *MARKOV PROCESSES, CORE STORAGE, COSTS, EQUATIONS, OBSERVATION, OPTIMIZATION,

AD-A223 769 CONTINUED

POLICIES, REPLACEMENT, REPRINTS, SOLUTIONS(GENERAL), STRUCTURAL PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A223 768 7/6

AKRON UNIV OH INST OF POLYMER SCIENCE

(U) Viscoelasticity and Tearing Energy of Fluorinated Hydrocarbon Elastomers,

OCT 83 21P

PERSONAL AUTHORS: Plazek, D. J.; Choy, In-Chul; Kelley, F. N.; Von Meerwall, E.; Su, Long-Ji

CONTRACT NO. F49620-86-C-0032

PROJECT NO. 2303

TASK NO. 17

MONITOR: AFOSR
TR-90-0697

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Rubber Chemistry and Technology, v56 n4 p865-882 Sep-Oct 83.

ABSTRACT: (U) Nearly all fractures of polymeric materials occur during dissipative deformations. Thus, their strength is determined by the number of associated or relevant viscoelastic mechanisms present in their response. A number of investigations have contributed to the establishment of the preceding conclusion. Only with great care and effort can fractures be brought about at relatively high temperatures and long times, or in the swollen state, so that chemical bond strengths can principally determine the material's strength. This study has been directed toward the elucidation of how molecular architecture and the chemical type of network polymer determine the viscoelastic processes which are relevant to fracture behavior. Several series of elastomeric materials have been studied. Both the fracture and the viscoelastic behavior of urethane end-linked polybutadienes, dicumyl peroxide crosslinked polybutadienes, fluorinated hydrocarbon elastomers ('Viton' A fluoroelastomer), and a urethane end-linked styrene-butadiene rubber (SBR) have been determined. Reprints. (jes)

DESCRIPTORS: (U) *ELASTOMERS, *POLYMERS, ARCHITECTURE, BEHAVIOR, BONDED JOINTS, CHEMICAL BONDS, CHEMICALS,

AD-A223 768 CONTINUED

DEFORMATION, DISSIPATION, ENERGY, FLUOROPOLYMERS, FRACTURE(MECHANICS), HIGH TEMPERATURE, HYDROCARBONS, MATERIALS, MOLECULES, NETWORKS, REPRINTS, STRENGTH(GENERAL), STRENGTH(MECHANICS), TEARING, VISCOELASTICITY.

IDENTIFIERS: (U) Pe61102F, WUAFOSR2303A3.

AD-A223 765 6/5

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Flow Cytometric Analysis of Hepatocytes from Normal, PFDA, and PH/DEN/PB-Treated Rats.

DESCRIPTIVE NOTE: Final rept.,

DEC 89 21P

PERSONAL AUTHORS: Tarr, Melinda J.; Frazier, Donald E.

CONTRACT NO. AFOSR-88-0216

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-90-0677

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this project was to provide preliminary data regarding the hepatotoxic and immunotoxic effects of perfluorodecanoic acid (PFDA). Flow cytometric evaluation of hepatocytes from PFDA-treated rats revealed an increase in size and granularity and a shift from tetraploidy towards diploidy, in rats treated with 50 mg/kg PFDA, as well as a suggestion of interference with lymphocyte blast transformation of splenocytes in these rats. These preliminary studies suggest that PFDA induces hepatocellular alterations which are detectable by flow cytometry, and induces both morphologic and possibly functional modulation of the immune system. Further studies are indicated to determine the significance of these findings. Keywords: Perfluorodecanoic acid(PFDA); Hepatocarcinogenesis; Preneoplastic lesions; Flow cytometry; Immunotoxicity. (jes)

DESCRIPTORS: (U) *CELLS(BIOLOGY), IMMUNITY, LESIONS, LIVER, LYMPHOCYTES, MODULATION, RATS, TRANSFORMATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5, LPN-OSRU-RF-76680/720912.

AD-A223 748 20/12 12/3

PURDUE UNIV LAFAYETTE IN SCHOOL OF ELECTRICAL ENGINEERING

(U) II-VI Semiconductor Superlattices.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 85-30 Jun 89.

APR 90 16P

PERSONAL AUTHORS: Gunshor, Robert L.; Otsuka, Nobuo

CONTRACT NO. AFOSR-85-0185

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR TR-90-0718

UNCLASSIFIED REPORT

ABSTRACT: (U) ZnSe was doped with Ga to electron concentrations in the low 10 to the 17th power/cc. range. It was determined that optimum doping occurred for a Se: Zn flux ratio of close to unity as measured with a quartz crystal monitor. DLTS measurements indicated that delta doped samples had an order of magnitude less deep level traps than uniformly doped samples. Monte Carlo simulations of the growth kinetics of ZnSe, combined with absolute flux measurements, provided information about sticking coefficients and insight into stoichiometric growth conditions. The nucleation of epitaxial ZnSe on epitaxial GaAs was studied for the first time. MISFET devices were fabricated, and MIS capacitor C-V characteristics were used to evaluate the properties of the heterovalent interface Techniques were found by which interface state densities were reduced to values comparable to (Al,Ga)As. Keywords: Monte Carlo method; MOSFET semiconductors; Lattice dynamics. (CP)

DESCRIPTORS: (U) *SEMICONDUCTORS, *ZINC SELENIDES, *SUPERLATTICES, CAPACITORS, COEFFICIENTS, DENSITY, DOPING, ELECTRON DENSITY, EPITAXIAL GROWTH, FLUX(RATE), GALLIUM, GALLIUM ARSENIDES, GROUP II-VI COMPOUNDS, INTERFACES, KINETICS, LATTICE DYNAMICS, MEASUREMENT, MONTE CARLO METHOD, MOSFET SEMICONDUCTORS, OPTIMIZATION, RATIOS,

AD-A223 748 CONTINUED

SIMULATION, STOICHIOMETRY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

AD-A223 722 20/3 4/1 12/1

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) Laboratory Graduate Fellowship Program, 1989. Appendix E. Thesis.

DESCRIPTIVE NOTE: Annual rept.,

89 560P

PERSONAL AUTHORS: Darrah, Rodney C.; Cavender, Claude

CONTRACT NO. F49620-86-C-0127

PROJECT NO. 3484

TASK NO. D6

MONITOR: AFOSR
TR-90-0695-APP-E

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-A223 656.

ABSTRACT: (U) Abstract of Dissertation: Electromagnetic Excitations on Antiferromagnets: Surface Polaritons and Leaky Waves. Surface polaritons exist at frequencies between 250 GHz and a few THz when propagating on antiferromagnets. They have been predicted theoretically and observed recently on MnF2 in reflection measurements. Although damping is necessary for coupling between the surface polariton modes and incident light waves, theoretical studied have not examined the effect of damping on the surface polariton modes. An analysis of the surface polariton modes, with damping, is done by solving the dispersion equation and by studying the classical electromagnetic Green's functions for a semi-infinite antiferromagnet. Sodium Lidar Studies of the Horizontal Variability of Gravity Waves in the Mesosphere: A data analysis technique for determining gravity wave intrinsic parameters is presented. The intrinsic parameters include the horizontal and vertical wavelengths, period, and wave propagation direction. The technique involves measuring the altitude variations of the wave induced density perturbations in the mesospheric Na layer. Lattice Structures in the Image Algebra and Applications to Image Processing; The research is concerned with the investigation of an algebraic

AD-A223 722 CONTINUED

structure, known as image algebra, which is used for expressing algorithms in image processing. (jhd)

DESCRIPTORS: (U) *ANTIFERROMAGNETISM, *IMAGE PROCESSING, *PLASMA WAVES, *ATMOSPHERIC DISTURBANCES, *ELECTROMAGNETIC WAVE REFLECTIONS, ALGEBRA, ALGORITHMS, ALTITUDE, DAMPING, DATA PROCESSING, DENSITY, DISPERSING, ELECTROMAGNETISM, EQUATIONS, FREQUENCY, GREENS FUNCTION, HORIZONTAL ORIENTATION, IMAGES, LIGHT, MEASUREMENT, MESOSPHERE, METHODOLOGY, OPTICAL RADAR, PERTURBATIONS, PROPAGATION, REFLECTION, SODIUM, VARIATIONS, VERTICAL ORIENTATION, WAVE PROPAGATION, THESES.

IDENTIFIERS: (U) Polaritions, Image algebra.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A223 721 5/1

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) Laboratory Graduate Fellowship Program, 1989. Appendix D, Part 2. Certifications and Concurrence.

DESCRIPTIVE NOTE: Annual rept.,

89 545P

PERSONAL AUTHORS: Darrah, Rodney C.; Cavender, Claude

CONTRACT NO. F49620-86-C-0127

PROJECT NO. 3484

TASK NO. D6

MONITOR: AFOSR
TR-90-0695-APP-D-PT-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Appendix E, AD-A223 722.

DESCRIPTORS: (U) *RESEARCH MANAGEMENT, STUDENTS, THESES, FINANCE, UNIVERSITIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR3484D6, Certification.

AD-A223 720 5/2

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) Laboratory Graduate Fellowship Program, 1989. Appendix D, Part 1. Certifications and Concurrence.

DESCRIPTIVE NOTE: Annual rept.,

89 277P

PERSONAL AUTHORS: Darrah, Rodney C.; Cavender, Claude

CONTRACT NO. F49620-86-C-0127

PROJECT NO. 3484

TASK NO. D6

MONITOR: AFOSR
TR-90-0695-APP-D-PT-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Appendix D, Part 2, AD-A223 721.

DESCRIPTORS: (U) *RESEARCH MANAGEMENT, STUDENTS, THESES, FINANCE, UNIVERSITIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR3484D6, Certifications.

AD-A223 696 11/4 7/6

PENNSYLVANIA STATE UNIV UNIVERSITY PARK COMPOSITES MANUFACTURING TECHNOLOGY C ENTER

(U) Prediction and Control of Processing-Induced Residual Stresses in Composites. Part 2. AS4/PEEK Composite.

DESCRIPTIVE NOTE: Final rept.,

OCT 89 89P

PERSONAL AUTHORS: Schulte, K. J.; Hahn, H. T.

REPORT NO. CMTC-8945

CONTRACT NO. AFOSR-87-0242

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-90-0570

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part 1, AD-A222 549.

ABSTRACT: (U) Residual stresses in symmetric cross-ply laminates were monitored by measuring the dimensionless curvature. The cooling rate was found to have a significant influence on the amount of residual stress in graphite/PEEK (APC-2) laminates. The transverse strain due to crystallization was not negligible and must be considered when predicting residual stresses for cooling rates of 75 deg C/min and lower. The stress-free temperature for 03/90(3) APC-2 laminates decreases with increasing cooling rate. Successive unconstrained heating/cooling provided the necessary environment for less stress relaxation allowing the specimens to move toward an equilibrium stress-free temperature (SFT) of 328 deg C. The SFT for any heating cycle was found to be equivalent to the previous cooling cycle SFT. The SFT is strongly dependent on geometrical constraint during thermal cycling because of the stress relaxation. Keywords: AS4/PEEK Composite, Laminates, SFT, Thermoplastic matrix composites. (jg)

DESCRIPTORS: (U) *LAMINATES, *RESIDUAL STRESS, COMPOSITE

AD-A223 696 CONTINUED

MATERIALS, COOLING, CRYSTALLIZATION, CYCLES, EQUILIBRIUM(GENERAL), GRAPHITE, HEATING, MATRIX MATERIALS, RATES, STRESS RELAXATION, STRESSES, SYMMETRY, TEMPERATURE, THERMOPLASTIC RESINS.

IDENTIFIERS: (U) AS4/PEEK Composite, SFT.

AD-A223 678 20/4

CALIFORNIA UNIV LOS ANGELES DEPT OF MECHANICAL AEROSPACE AND NUCLEAR ENGINEER ING

(U) An Additive Turbulent Decomposition of the Navier-Stokes Equations Implemented on Highly Parallel Computer Systems.

DESCRIPTIVE NOTE: Final rept. 1 Apr 89-31 Mar 90,

MAY 90 38P

PERSONAL AUTHORS: McDonough, J. M.; Hylin, E. C.; Catton, Ivan; Chan, Tony F.; Mathew, T.

CONTRACT NO. AFOSR-89-0281

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-90-0676

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress is reported on a study of a new turbulence simulation technique based on an unaveraged, additive decomposition of the Navier-Stokes equations. The decomposition provides a natural separation of the governing equations into large- and small-scale parts, with the small scale solved on local subdomains to provide a high degree of parallelism. Results presented here include formal consistency and accuracy proofs for Burgers' and the full 3-D, incompressible Navier-Stokes equations, as well as various details of transferring information between the large- and small-scale calculations. Initial work on applying the method to the study of transition to turbulence in circular pipe flow is also documented. In addition, studies on the domain decomposition and multigrid aspects of the method, using the Schwarz alternating method and the full-approximation scheme, is included. Keywords: Turbulence simulation, Navier Stokes equations, Additive decomposition, Large eddy simulation, Burgers equations. (jhd)

DESCRIPTORS: (U) *EDDIES(FLUID MECHANICS), *NAVIER STOKES EQUATIONS, *TURBULENCE, ACCURACY, CIRCULAR, DECOMPOSITION, FLUID FLOW, INCOMPRESSIBLE FLOW, PARALLEL

AD-A223 678 CONTINUED

PROCESSORS, PIPES, SEPARATION, COMPUTERIZED SIMULATION.

IDENTIFIERS: (U) Turbulent decomposition.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A223 657 5/1

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) Laboratory Graduate Fellowship Program, 1989. Appendix A. Forms.

DESCRIPTIVE NOTE: Annual rept.,

89 92P

PERSONAL AUTHORS: Darrah, Rodney C.; Cavender, Claude

CONTRACT NO. F49620-86-C-0127

PROJECT NO. 2306

TASK NO. D6

MONITOR: AFOSR
TR-90-0694

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-A223 656.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, *RESEARCH MANAGEMENT, LABORATORIES, AIR FORCE FACILITIES, FORMS(PAPER), GRADUATES, STUDENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306D6, Air Force laboratories.

AD-A223 656 5/1

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) Laboratory Graduate Fellowship Program, 1989.

DESCRIPTIVE NOTE: Annual rept.,

89 38P

PERSONAL AUTHORS: Darrah, Rodney C.; Cavender, Claude

CONTRACT NO. F49620-86-C-0127

PROJECT NO. 3484

TASK NO. D6

MONITOR: AFOSR
TR-90-0693

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Appendix A, AD-A223 657.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, *RESEARCH MANAGEMENT, LABORATORIES, AIR FORCE FACILITIES, GRADUATES, STUDENTS, STATISTICAL DATA.

IDENTIFIERS: (U) PE61102F, WUAFOSR3484D6, Air Force laboratories, Graduate fellowships.

AD-A223 653 7/4

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Adsorption of Pyridine on Polycrystalline Gold Electrode Studied by Radioactive-Labeling Method,

90 7P

PERSONAL AUTHORS: Zelenay, P.; Rice-Jackson, L. M.; Wieckowski, A.

CONTRACT NO. AFOSR-89-0368

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-90-0726

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Langmuir, v6 p974-979 1990.

ABSTRACT: (U) Adsorption of pyridine on smooth polycrystalline gold was studied by the use of the radioactive-labeling method and electrochemistry. The adsorption is reversible and, in the range of the structural uniformity of the adsorbate, characterized by the standard Gibbs energy of adsorption of 30 KiloJoules per mole. Weak repulsive interactions between vertically adsorbed pyridine molecules were found. At low bulk concentrations of the adsorbate, a horizontally oriented pyridine occupies the surface and rearranges to the vertical form with the increase in the electrode potential. The contrasting cases of pyridine adsorption on gold from acidic and neutral solution and differences encountered in bonding of pyridine by polycrystalline gold and platinum are discussed. Keywords: Reprints, Surface properties, Organic compound, Organic base, Transition metals, Aromatic ring, Nitrogen, SERS. (JG)

DESCRIPTORS: (U) *ADSORPTION, *ELECTRODES, *GOLD, *POLYCRYSTALLINE, *PYRIDINES, ACIDS, AROMATIC COMPOUNDS, CONCENTRATION(COMPOSITION), ELECTROCHEMISTRY, HORIZONTAL ORIENTATION, LOW LEVEL, MOLECULES, NEUTRAL, NITROGEN, ORGANIC COMPOUNDS, PLATINUM, REPRINTS, RINGS, SOLUTIONS(GENERAL), SURFACE PROPERTIES, TRANSITION METALS, VERTICAL ORIENTATION, BASES(CHEMISTRY).

AD-A223 653

AD-A223 653 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1, Radioactive-labeling method, SERS.

AD-A223 652 11/6.2

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) Temperature Dependence of the Collisional Quenching of NH(a 1(Delta)) by N2, O2, CO and Xe,

90 5P

PERSONAL AUTHORS: Nelson, H. H.; McDonald, J. R.; Alexander, Millard H.

CONTRACT NO. F49620-88-C-0056

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-90-0717

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v94 p3291-3294 1990.

ABSTRACT: (U) We have measured the temperature dependence of the collision-induced quenching rate constant for NH(a1 delta) with the collision partners Nitrogen, Carbon Monoxide, Oxygen, and Xenon. As expected, quenching by CO and Xe is temperature independent with quenching cross sections of 1.9 and 1.5 A2, respectively. Keywords: Electronic quenching, Imidogen, Fabrication metallurgy, Reprints, Singlet ammonium radical. (jg)

DESCRIPTORS: (U) *AMMONIUM COMPOUNDS, *COLLISIONS, *QUENCHING, *THERMAL PROPERTIES, CARBON MONOXIDE, CROSS SECTIONS, ELECTRONICS, FABRICATION, METALLURGY, NITROGEN, OXYGEN, REPRINTS, XENON.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, Imidogen.

AD-A223 650 7/2 20/6

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Scanning Tunneling Microscopy Investigations of the Local Electronic and Structural Effects of Iron Substitution in Tantalum Disulfide,

90 8P

PERSONAL AUTHORS: Chen, Huifen; Wu, Xian L.; Lieber, Charles M.

CONTRACT NO. AFOSR-90-0029

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-90-0723

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v112 p3326-3332 1990.

ABSTRACT: (U) The microscopic structural and electronic properties of the charge density wave (CDW) phases in a series of iron-substituted tantalum disulfide materials, Fe(x)Ta(1-x)S2, have been characterized using scanning tunneling microscopy (STM). On average, the incommensurate CDW phase exhibits a regular hexagonal superlattice for x(Fe) < or = 0.02. At the atomic level, however, analysis of real-space STM images shows that there are well-defined defects in this CDW structure. The frequency and size of the defects depend directly on the concentration of iron. Furthermore, atomic resolution images demonstrate that these defects involve a spatially localized CDW amplitude distortion or coupled amplitude-position distortion. For x(Fe) > or = 0.04 the CDW superlattice exhibits large distortions in the wavelength and amplitude. The distortions in the CDW structure have been characterized as a function of iron concentration using real-space wavelength measurements and two-dimensional Fourier transform power spectra of the images. These results resolve the source of differences between STM and previous diffraction studies of metal-substituted tantalum disulfide, and also indicate that above a critical concentration of iron the properties of the CDW

AD-A223 650 CONTINUED

phase in these materials change significantly. The origin of this critical concentration is discussed. Keywords: Scanning tunneling microscopy, Metal doping, Electronic, Structure, Tantalum disulfide, Reprints, CDW, STM, Diffraction techniques, Crystal growth, Optics. (JG)

DESCRIPTORS: (U) *ELECTRONICS, *IRON, *MICROSCOPY, *SCANNING, *STRUCTURAL PROPERTIES, *SULFIDES, *TANTALUM, *TUNNELING, AMPLITUDE, ATOMIC ENERGY LEVELS, ATOMIC PROPERTIES, CHARGE DENSITY, CONCENTRATION(CHEMISTRY), CRYSTAL GROWTH, CRYSTAL LATTICES, DEFECTS(MATERIALS), DIFFRACTION, DIFFRACTION ANALYSIS, DISTORTION, DOPING, IMAGES, IRON COMPOUNDS, MATERIALS, METALS, OPTICS, REPRINTS, RESOLUTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2, CDW, STM.

AD-A223 649 7/4

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Radioactive Labeling Study of Sulfate/Bisulfate Adsorption on Smooth Gold Electrodes,

90 14P

PERSONAL AUTHORS: Zelenay, P.; Rice-Jackson, L. M.; Wieckowski, A.

CONTRACT NO. AFOSR-89-0368

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-90-0725

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. Electroanal. Chem., v283 p389-401 1990.

ABSTRACT: (U) Adsorption of sulfate/bisulfate anions was studied on a smooth gold electrode by the use of the radioactive labeling method. Adsorption is reversible with respect to the bulk concentration of adsorbate and the electrode potential. The chemical component in adsorption is weak, as assessed from an almost linear relationship between surface concentration and the electrode potential. This indicates that the surface attachment occurs predominantly through electrostatic interactions between the surface and the ions, which were concluded to be bisulfate anions. Processing the radiochemical information using the Bennes adsorption isotherm yields basic thermodynamic magnitudes, such as standard Gibbs energy of adsorption and the interaction energy. Their analysis reveals that in the studied bulk concentration range a strong interionic repulsion limits the uptake of anions to ca. 30% of a maximum coverage. Keywords: Reprints, Au, Electrochemical adsorption, Radiochemical research, Isotherms, Chemical reactions. (JG)

DESCRIPTORS: (U) *ADSORPTION, *ANIONS, *ELECTRODES, *GOLD, *SULFATES, ATTACHMENT, CHEMICAL COMPOSITION, CHEMICAL REACTIONS, ELECTROCHEMISTRY, ELECTROSTATICS,

AD-A223 649 CONTINUED

ENERGY, INTERACTIONS, IONS, LINEARITY, RADIOCHEMISTRY, REPRINTS, SURFACES, ISOTHERMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1, Radioactive labeling study, Au.

AD-A223 640 12/1 20/9

ILLINOIS UNIV AT URBANA DEPT OF MATHEMATICS

(U) Unstable Phenomena in Mechanical Systems.

DESCRIPTIVE NOTE: Final rept. 1 May 88-30 Apr 90,

MAY 90 7P

PERSONAL AUTHORS: Newton, Paul K.

CONTRACT NO. AFOSR-88-0185

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-90-0732

UNCLASSIFIED REPORT

ABSTRACT: (U) This report has focused on the development of mathematical techniques to understand unstable physical processes with particular emphasis on dynamic behavior in fluids, plasmas, and multi-particle systems. The particular focus has been on the development of singular perturbation techniques to study amplitude equations arising in hydrodynamic stability theory, in particular the Ginzburg-Landau equation of fluid dynamics and the Zakharov equation of plasma physics. Two successful approaches have been developed to these problems. The first is directed at studying branching and bifurcation processes near nonlinear plane waves and the second approach focused on the singular (NLS) limit of the Zakharov system governing plasma turbulence. Keywords: Perturbation theory; Hydrodynamic configurations; Mathematics. (cp)

DESCRIPTORS: (U) *HYDRODYNAMIC CONFIGURATIONS, *MATHEMATICAL ANALYSIS, *PERTURBATION THEORY, *PLASMAS(PHYSICS), AMPLITUDE, BIFURCATION(MATHEMATICS), DYNAMIC RESPONSE, EQUATIONS, FLUID DYNAMICS, FLUIDS, HYDRODYNAMICS, MATHEMATICS, MECHANICAL COMPONENTS, PERTURBATIONS, STABILITY, THEORY, TURBULENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A4, Ginzburg-Landau equations, Zakhrov equations.

AD-A223 637 12/7 13/6 15/5

COMPUTER AIDED PLANNING AND SCHEDULING INC ATLANTA GA

(U) An Integrated Concept for Scheduling Transportation Networks.

DESCRIPTIVE NOTE: Final rept. 15 Sep 89-14 Mar 90,

MAR 90 32P

PERSONAL AUTHORS: Nulty, William G.

CONTRACT NO. F49620-89-C-0098

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-90-0733

UNCLASSIFIED REPORT

ABSTRACT: (U) The focus of this research is to investigate and develop methodologies for the integration of optimization, human interactions, simulation, and knowledge base to address the problems of scheduling transportation networks. These four techniques have been traditionally applied in isolation when addressing scheduling problems, resulting in serious modeling limitations. However, the complementary strengths of these techniques suggest a synthesis that would provide dramatic improvement in the ability to solve these problems. We have developed a prototype model that demonstrates the novel power and benefit of this integration. The concept and methodologies have been tested and proven successful. Transportation networks are the fundamental structures associated with the movement and storage of material. The basic elements of the transportation networks include material movement requirements, transportation vehicles, points (facilities for supplying and receiving movement requirements), links (relationships between points), and crews. Through the generalization of the transportation network structure, a large variety of logistics problems can be modeled in the same fashion, bearing similar mathematical properties, and can studied and solved in a disciplined (as opposed to ad hoc) manner. (KR)

AD-A223 637 CONTINUED

DESCRIPTORS: (U) *NETWORK ANALYSIS(MANAGEMENT), *INTEGRATED SYSTEMS, *LOGISTICS MANAGEMENT, *SCHEDULING, *MILITARY TRANSPORTATION, HUMANS, INTEGRATION, INTERACTIONS, ISOLATION, LIMITATIONS, MATERIALS, MATHEMATICS, MODELS, NETWORKS, OPTIMIZATION, PROTOTYPES, SIMULATION, STORAGE, STRENGTH(GENERAL), SYNTHESIS, VEHICLES.

IDENTIFIERS: (U) PE65502F, WUAFOSR3005A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A223 636 12/2

CALIFORNIA UNIV BERKELEY DEPT OF MATHEMATICS

(U) Use of an Indefinite Inner Product for Computing Damped Natural Modes.

DESCRIPTIVE NOTE: Final rept. 1 Oct 87-30 Sep 89,

SEP 89 35P

PERSONAL AUTHORS: Parlett, B. N.; Chen, H. C.

REPORT NO. CPAM-435

CONTRACT NO. AFOSR-88-0048

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-90-0734

UNCLASSIFIED REPORT

ABSTRACT: (U) A quadratic eigenvalue problem with symmetric positive definite coefficient matrices may be reduced to linear form while retaining symmetry in the new coefficients but neither of them will be positive definite. Formally the symmetric Lanczos algorithm and subspace iteration may be used to compute some eigenpairs of the linear problem. The trouble is that the basis vectors are orthogonal with respect to an indefinite inner product so there is no assurance that they will be linearly independent. Nevertheless this is an attractive way to solve the original problem and we discuss how to implement it and how it relates to the unsymmetric Lanczos procedures. We discuss complex origin shifts, reorthogonalization, and error bounds. Several methods for solving the reduced problem are mentioned but we have no fully satisfying technique. Some dangers are described and examples are given comparing our Lanczos program with a modified subspace iteration. Keywords: Linear differential equations, Theoretical mathematics, Lanczos algorithm, Indefinite inner product, Computing damped natural modes, Mechanics, Engineering. (JG)

DESCRIPTORS: (U) *DAMPING, *EIGENVALUES, *LINEAR DIFFERENTIAL EQUATIONS, *MATHEMATICS, *QUADRATIC

AD-A223 636 CONTINUED

EQUATIONS, ALGORITHMS, COEFFICIENTS, INTERNAL, LINEARITY, REDUCTION, MECHANICS, ENGINEERING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3, Lanczos algorithm.

AD-A223 624 12/6 9/5

COLORADO UNIV AT BOULDER DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Optical Signal Computing.

DESCRIPTIVE NOTE: Final rept. 1 May 86-31 Dec 89,

DEC 89 20P

PERSONAL AUTHORS: Cathey, Wade T.; Schmidt, Rodney A.; Moddel, Garret

REPORT NO. 1536920

CONTRACT NO. AFOSR-86-0189

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-90-0671

UNCLASSIFIED REPORT

ABSTRACT: (U) Architectures for optical symbolic computing were designed, devices were designed and built that were specifically for the architectures, and test circuits for some of the logic elements were designed, constructed, and operated. The research elements were designed, constructed, and operated. The research led to novel architectures for optical symbolic computing. Devices were developed that are suitable for optical 2-D memory and logic. These devices are pixilated photo-addressed spatial light modulators (SLMs) with a three-terminal arrangement so that the threshold can be adjusted. Spinoff non-pixilated devices are useful as high frame rate, high-resolution SLMs that can be used for many optical signal processing applications. Keywords: Optical computing; Artificial computing; Artificial intelligence; Symbolic logic; Optical processing; Spatial light modulators. (jhd)

DESCRIPTORS: (U) *OPTICAL PROCESSING, *COMPUTER ARCHITECTURE, ARTIFICIAL INTELLIGENCE, CIRCUITS, COMPUTATIONS, LIGHT MODULATORS, LOGIC ELEMENTS, SIGNAL PROCESSING, SPATIAL DISTRIBUTION, SYMBOLS, TEST AND EVALUATION, COMPUTER LOGIC.

AD-A223 624

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A223 615 23/3 12/3

BROWN UNIV PROVIDENCE RI DEPT OF PHYSICS

(U) Theoretical and Experimental Research Into Biological Mechanisms Underlying Learning and Memory.

DESCRIPTIVE NOTE: Final progress rept. 1 Aug 88-31 Jul 89,

APR 90 19P

PERSONAL AUTHORS: Cooper, Leon N.

CONTRACT NO. AFOSR-88-0228

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR
TR-90-0672

UNCLASSIFIED REPORT

ABSTRACT: (U) We describe an extended model of backward propagation incorporating gain modification and compare the performance of the extended model with ordinary backward propagation. We also describe our work on a statistical model for feature extraction based on the BCM neural network model. The model is presented as an exploratory (PP) (Projection Pursuit) algorithm. The formulation, which is similar in nature to PP, is based on a minimization of a cost function over a set of parameters, yielding an optimal decision rule under some norm. A new projection index (cost function) was presented that favors directions possessing multi-modality, where the multi-modality is measured in terms of the separability property of the data. The synaptic modification equations, which perform the minimization of the cost function, turn out to be similar to the synaptic modification equations governing learning in BCM neurons. Keywords: Backward propagation, Statistical model. (CP)

DESCRIPTORS: (U) *MODELS, *NEURAL NETS, ALGORITHMS, COSTS, EQUATIONS, FUNCTIONS, GAIN, MATHEMATICAL MODELS, MODIFICATION, OPTIMIZATION, PARAMETERS, STATISTICAL ANALYSIS, SYNAPSE.

IDENTIFIERS: (U) *Backward propagation.

AD-A223 611 12/9 23/3 12/3

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF BIOPHYSICS

(U) IEEE Conference on Neural Information Processing Systems - Natural and Synthetic Held in Denver, Colorado on 28 November-1 December 1988.

DESCRIPTIVE NOTE: Final rept. 15 Aug 88-14 Aug 89,

AUG 89 51P

PERSONAL AUTHORS: Sejnowski, Terrence

CONTRACT NO. AFOSR-88-0287

PROJECT NO. 2305

TASK NO. K5

MONITOR: AFOSR
TR-90-0719

UNCLASSIFIED REPORT

ABSTRACT: (U) Partial Contents: Speedy Alternatives to Back Propagation; Mean Field Annealing and Neural Networks; Comparison of Two LP Parametric Representations in a Neural Network-Based Speech Recognizer; Neural Net Receivers in Spread-Spectrum Multiple-Access Communication Systems; Modeling a Central Pattern Generator in Software and Hardware: Tritonia in Sea Moss; Storage of Covariance by the Selective Long-Term Potentiation and Depression of Synaptic Strengths in the Hippocampus; Convergence and Pattern-Stabilization in the Boltzmann Machine; MOS Charge Storage of Adaptive Networks; A Link Between Markov Models and Multilayer Perceptrons; Programmable Analog Pulse-Firing Neural Networks. (CP)

DESCRIPTORS: (U) *INFORMATION PROCESSING, *NEURAL NETS, *SPEECH RECOGNITION, ADAPTIVE SYSTEMS, ANNEALING, COMMUNICATION AND RADIO SYSTEMS, COMPUTER PROGRAMS, COVARIANCE, HIPPOCAMPUS, MARKOV PROCESSES, MATHEMATICAL MODELS, MEAN, MULTIPLE ACCESS, NETWORKS, PARAMETRIC ANALYSIS, RECEIVERS, SPREAD SPECTRUM.

AD-A223 608 12/6

CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

(U) Request for Instrumentation.

DESCRIPTIVE NOTE: Final rept. 1 Jul 84-30 Jun 85,

SEP 84 5P

PERSONAL AUTHORS: Polak, E.

CONTRACT NO. AFOSR-84-0250

PROJECT NO. 2917

TASK NO. A5

MONITOR: AFOSR
TR-90-0739

UNCLASSIFIED REPORT

ABSTRACT: (U) A VAX 11/780 system has been expanded so as to facilitate the implementation of DELIGHT. MIMO, an interactive software system for the solution of optimal, worst case design of multivariable control systems. Also a SUN workstation - based system has been assembled for experiments in distributed computing for the optimal, integrated design of flexible structures and their control systems. Keywords: VAX 11/780, Worst case design, Software system, Delight, MIMO. (CP)

DESCRIPTORS: (U) *COMPUTERS, COMPUTER PROGRAMS, CONTROL SYSTEMS, DISTRIBUTED DATA PROCESSING, FLEXIBLE STRUCTURES, INTEGRATED SYSTEMS, MULTIVARIATE ANALYSIS, OPTIMIZATION, STATIONS.

IDENTIFIERS: (U) VAX-11/780 Computers, DELIGHT.MIMO Computer Program, SUN Workstations, WUAFOSR2917A5, PE61102F.

AD-A223 578 20/9 20/2 12/7

MASSACHUSETTS INST OF TECH CAMBRIDGE PLASMA FUSION CENTER

(U) Innovative Uses of Parallel Computers.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Oct 89,

MAY 90 4P

PERSONAL AUTHORS: Vichniac, Gerard; Molvig, Kim

CONTRACT NO. AFOSR-89-0119

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-90-0735

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the significant discoveries that was made was primarily supported by the ONR and involves the development and extensive simulations of an original model that demonstrates the viability of the 'lattice-gas' approach to hydrodynamics. The model overcomes major difficulties of the previous discrete approaches. These difficulties can be traced to discretization artifacts that introduce a violation of the Galilean invariance and spurious energy terms in the equation of state. (CP)

DESCRIPTORS: (U) *PARALLEL PROCESSING, COMPUTERS, ENERGY, EQUATIONS OF STATE, HYDRODYNAMICS, SPURIOUS EFFECTS, MATHEMATICAL MODELS, SIMULATION.

IDENTIFIERS: (U) Lattice Gases, PE61102F, WUAFOSR2304A3.

AD-A223 576 20/3

STANFORD UNIV CA DEPT OF APPLIED PHYSICS

(U) Thin Films, Composites and Superconducting Junctions.

DESCRIPTIVE NOTE: Interim rept. 1 Oct 84-31 Mar 85,

AUG 85 16P

PERSONAL AUTHORS: Gaballe, T. H.

CONTRACT NO. F49620-83-C-0014

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR
TR-90-0736

UNCLASSIFIED REPORT

ABSTRACT: (U) The important issue of how the superconducting transition temperature Tc in disordered system changes near the M-I transition where strong localization (k sub F 1 about 1) is expected has been studied in the Mo-Ge system. In the high Mo concentration, which is in the weakly localized regime, Tc decreases linearly with decreasing Mo concentration. In this region the ratio cf electron-phonon coupling constant lambda to the bare density of states N sub b(0) is constant, which is consistent with the Varma-Dynes tight-binding model. An extrapolation of the linear behavior of Tc in this regime yields the disappearance of Tc near 35 at. % Mo. Superconductivity in very thin films of niobium has been investigated. By use of the ion gun which has been installed in the evaporator it has been possible to identify 3 separate mechanisms which contribute to the reduction in Tc as the film thickness is decreased, namely lifetime broadening, proximity effect and localization. A small single grid ion source has been constructed in order to promote the growth of metastable films at low temperatures. Process has been made on a new ultra high vacuum M.B.E. evaporator. (JHD)

DESCRIPTORS: (U) *ORDER DISORDER TRANSFORMATIONS, *SUPERCONDUCTORS, *TRANSITION TEMPERATURE, COUPLING(INTERACTION), DENSITY, ELECTRONS, JUNCTIONS, LINEARITY, LOW TEMPERATURE, METASTABLE STATE, NIOBIUM,

AD-A223 576 CONTINUED

PHONONS, RATIOS, SUPERCONDUCTIVITY, THICKNESS, THIN FILMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306C1.

AD-A223 565 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Trapezoidal Stratified Monte Carlo Integration.

DESCRIPTIVE NOTE: Technical rept.,

MAR 90 32P

PERSONAL AUTHORS: Masry, Elias

REPORT NO. TR-286

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0650

UNCLASSIFIED REPORT

ABSTRACT: (U) Weighted integrals of random processes are approximated by the trapezoidal rule based on a stratified and symmetrized random sample of size n. The weight functions are assumed to be twice continuously differentiable. We consider the rate of convergence to zero of the mean-square integral approximation error as the sample size increases indefinitely. For random processes which are twice mean-square continuously differentiable it is shown that the rate is N to the minus 5th power, just as without a random component. For random processes which are a bit more than once, but not twice, mean-square continuously differentiable the rate is shown to be N to the minus 4th power. In both cases the asymptotic constant is also determined. (KR)

DESCRIPTORS: (U) *MONTE CARLO METHOD, *STATISTICAL SAMPLES, INTEGRALS, WEIGHTING FUNCTIONS, STRATIFICATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, *Trapezoids.

AD-A223 565

AD-A223 542 6/5

YORK UNIV DOWNSVIEW (ONTARIO)

(U) Objective Investigation of Visual Function Using a Nondestructive Zoom-FET Technique for Evoked Potential Analysis,

MAY 89 13P

PERSONAL AUTHORS: Regan, M. P.; Regan, D.

CONTRACT NO. F49620-88-C-0002

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-90-0701

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in the Canadian Jnl. of Neurological Sciences, v16 n2 p168-179.

ABSTRACT: (U) We describe an ultra-high resolution technique for recording evoked potentials (EPs) that are thousands of times smaller than the total EEG power. We report that two superimposed visual stimulus patterns, one modulated at F1Hz and the other F2Hz, can generate 20 or more EP frequency components, each of which is contained within a bandwidth of no more than 0.004 Hz. We have developed a theoretical method for calculating the amplitudes and phases of these various cross-modulation components for different arrangements of model neurons. The relative amplitude of the various cross-modulation components seems to be a 'signature' of the particular neural model and this offers a way of testing theoretical neural models against EP data. As an illustration we compare the nonlinear EP components evoked by dichoptic stimulation with unpatterned flickering light against several models of binocular interaction. These nonlinear interaction terms may offer a means of investigating binocularity in amblyopic children or infants who have low acuity in one or both eyes. Canada. Reprints. (JES)

DESCRIPTORS: (U) *ELECTROENCEPHALOGRAPHY, *STIMULI, *VISUAL PERCEPTION, ACUITY, AMPLITUDE, BINOCULARS, CANADA, CHILDREN, CROSS MODULATION, EYE, FREQUENCY, INFANTS,

AD-A223 542

AD-A223 542 CONTINUED

INTERACTIONS, MODELS, NERVE CELLS, NERVOUS SYSTEM, NONLINEAR SYSTEMS, PATTERNS, POWER, REPRINTS, STIMULATION(GENERAL), THEORY, VISION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5, Evoked potentials.

AD-A223 541 7/3 7/2

CORNELL UNIV ITHACA NY DEPT OF CHEMISTRY

(U) Ammonolysis of Tantalum Alkyls: Formation of Cubic TaN and a Trimeric Nitride, (Cp*MeTaN)3,

90 10P

PERSONAL AUTHORS: Holl, Mark M.; Kersting, Meinolf; Pendley, Bradford D.; Wolczanski, Peter T.

CONTRACT NO. AFOSR-87-0103

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-90-0666

UNCLASSIFIED REPORT

ABSTRACT: (U) A burgeoning discipline of transition-metal inorganic and organometallic chemistry involves the preparation of solid-state materials via solution methods using molecular precursors. Conventional thermal techniques that typically result in thermodynamically determined products can be circumvented by using this approach. Potential advantages of such procedures include the discovery of low-temperature routes to known solids, the generation of intermediate oligomers or polymers that can be processed with greater efficiency, the utilization of complex, yet volatile, compounds for chemical vapor deposition (CVD), and the synthesis of new, kinetically stable materials. Refractory metal nitrides, a class of materials possessing interesting physical and electronic properties, are limited in scope with respect to related oxides, perhaps as a consequence of the severe conditions used in standard preparative procedures. From this standpoint, the development of solution syntheses to M(x) N(y) solids via inorganic or organometallic precursors represents an intriguing challenge in the materials field. Reported herein are initial efforts based on the ammonolysis of metal alkyls, including a model study that resulted in the formation of a trimeric nitride. With this method, a standard thermal process for the formation of cubic TaN was discovered. This phase has been previously prepared under relatively extreme conditions. Keywords: Reprints, Tantalum nitride, Ammonolysis, Bond

AD-A223 541 CONTINUED

breaking behavior, NH2(-), Nitrogen compounds, Oligomers, Chemical dissociation. (jg)

DESCRIPTORS: (U) *CHEMICAL DISSOCIATION, *NITRIDES, *TANTALUM COMPOUNDS, *AMMONIA, ADVERSE CONDITIONS, CHEMICAL REACTIONS, ELECTRONICS, INORGANIC MATERIALS, LOW TEMPERATURE, MATERIALS, MODELS, MOLECULES, NITROGEN COMPOUNDS, OLIGOMERS, ORGANOMETALLIC COMPOUNDS, OXIDES, PHYSICAL PROPERTIES, POLYMERS, PRECURSORS, PREPARATION, REFRACTORY METALS, REPRINTS, ROUTING, SOLID STATE ELECTRONICS, SOLIDS, SOLUTIONS(GENERAL), STABILITY, SYNTHESIS, THERMAL PROPERTIES, UTILIZATION, VAPOR DEPOSITION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, H(+), NH2(-), TAN, Ammonolysis, Bond breaking.

AD-A223 540 6/5

YORK UNIV DOWNSVIEW (ONTARIO)

(U) The Transducer Characteristic of Hair Cells in the Human Ear: A Possible Objective Measure,

88 4P

PERSONAL AUTHORS: Regan, D.; Regan, M. P.

CONTRACT NO. F49620-88-C-0002

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-90-0702

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Brain Research v438 p363-365 1988.

ABSTRACT: (U) We describe here a new kind of non-linear interaction between the responses to two simultaneously presented AM tones. The interaction occurs before the level of binaural convergence, and can be explained in terms of the shape of the inner ear hair cell transducer function. (JES)

DESCRIPTORS: (U) *EAR, CELLS, CONVERGENCE, HAIR, HUMANS, INTERACTIONS, NONLINEAR SYSTEMS, SHAPE, TRANSDUCERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5.

AD-A223 537 6/5

OREGON STATE UNIV CORVALLIS DEPT OF FISHERIES AND WILDLIFE

(U) 2,3,7,8-Tetrachlorodibenzo-p-dioxin Pretreatment of Female Mice Altered Tissue Distribution but not Hepatic Metabolism of a Subsequent Dose,

90 10P

PERSONAL AUTHORS: Curtis, Lawrence R.; Kerkvliet, Nancy I. ; Baecher-Steppan, Linda; Carpenter, Hillary M.

CONTRACT NO. AFOSR-87-0185

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-90-0670

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Fundamental and Applied Toxicology, v14 p523-531 1990.

ABSTRACT: (U) Concern over environmental contamination with 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) stimulated research of its toxic actions and underlying molecular events. Various epithelia, epithelial-derived tissues such as liver, and the immune system were identified as major target tissues. A toxic mechanism based upon interaction of TCDD with the Ah receptor and subsequent expression of a pleiotropic response provided an explanation for many reported phenomena. In light of the tissue and subcellular specificity of TCDD action, tissue distribution of a given dose likely has substantial effects on patterns of tissue damage. Further, chronic toxicity of repeated low doses may be influenced by factors which increase or decrease TCDD concentrations to which particular cell types are exposed. Reprints. (JES)

DESCRIPTORS: (U) *SENSE ORGANS, *TOXICITY, CONTAMINATION, DOSE RATE, ENVIRONMENTS, IMMUNITY, LIVER, LOW RATE, METABOLISM, MOLECULES, REPRINTS, STIMULATION(GENERAL), TARGETS, TISSUES(BIOLOGY).

AD-A223 537 CONTINUED

IDENTIFIERS: (U) WUAFOSR2312A5, PE61102F.

AD-A223 514 8/10

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CIVIL ENGINEERING

(U) Testing and Data Acquisition/Control Equipment for Soil Dynamics and Geotechnical Centrifuge Laboratory.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-31 Mar 90,

MAY 90 6P

PERSONAL AUTHORS: Dobry, Ricardo; Petrakis, Emmanuel

CONTRACT NO. AFOSR-89-0172

MONITOR: AFOSR
TR-90-0664

UNCLASSIFIED REPORT

ABSTRACT: (U) A description of equipment purchased under an AFOSR equipment grant is provided. This equipment is being used to extend the capabilities of the existing MTS servohydraulic axial-torsional testing machine to allow high precision tests on hollow cylinder soil specimens at constant mean stress levels, especially for specimens undergoing very small strains. The principal equipment items acquired are a computer based data acquisition and control system, a new hollow cylinder triaxial cell, a number of transducers and associated electronics, and mechanical hardware, including a new hydraulic power supply. In addition, several equipment items have been acquired with the RPI matching funds for the existing 100 g-ton geotechnical centrifuge, including a container for holding models during testing and a fork lift for model transport. Keywords: Laboratory/test equipment; Soil mechanics; Hollow cylinder tests; Data acquisition and control system; Geotechnical centrifuge; Soil dynamics. (edc)

DESCRIPTORS: (U) *SOIL TESTS, CENTRIFUGES, COMPUTERS, CONTROL SYSTEMS, CYLINDRICAL BODIES, DATA ACQUISITION, HYDRAULIC POWER, LABORATORIES, LABORATORY EQUIPMENT, TEST EQUIPMENT, SOIL MODELS, POWER SUPPLIES, PRECISION, RATES, SOIL DYNAMICS, SOIL MECHANICS, STRESSES, TEST AND EVALUATION, TRANSDUCERS.

IDENTIFIERS: (U) Geotechnical laboratories.

AD-A223 514

AD-A223 491 15/5 6/1

TEXAS UNIV AT SAN ANTONIO

(U) Multi-User Facility for High Performance Optical Recording of Brain Activity (DURIP).

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-30 Nov 89,

JUN 90 9P

PERSONAL AUTHORS: Senseman, David

CONTRACT NO. AFOSR-89-0118

PROJECT NO. 3842

TASK NO. A4

MONITOR: AFOSR
TR-90-0683

UNCLASSIFIED REPORT

ABSTRACT: (U) This equipment grant provided funds to purchase a Silicon Graphics workstation for optical recording of brain activity. The system is being used by scientists at the University of Texas and the USAF School of Aerospace Medicine to examine brain electrical activity related to aerospace environmental stresses. Keywords: Purchases; Logistics; Contracts; Guarantees; Military research; Computer; Disk drives.

DESCRIPTORS: (U) *BRAIN, *FACILITIES, *OPTICAL PROPERTIES, AEROSPACE ENVIRONMENTS, DISKS, DRIVES, ELECTRICAL PROPERTIES, GRAPHICS, GUARANTEES, LOGISTICS, MILITARY RESEARCH MONEY, PROCUREMENT, RECORDING SYSTEMS, SILICON, STATIONS, STRESSES, TEXAS, USER NEEDS, WORK.

IDENTIFIERS: (U) PE61102F, WUAFOSR3842A4.

AD-A223 491

AD-A223 479 12/9

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES INST FOR ROBOTICS AND INTELLIGE NT SYSTEMS

(U) Parallel Architectures and Algorithms for Image Understanding.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 88-30 Sep 89,

MAY 90 45P

PERSONAL AUTHORS: Nevatia, R.; Prasanna-Kumar, V. K.

CONTRACT NO. AFOSR-89-0032

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-90-0675

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) Several issues in using parallel processing for image understanding are addressed. First, efficient schemes for parallel image array access are developed. New class of latin squares called perfect latin squares are defined. Several construction methods are shown and some useful properties of such squares are identified. A generic parallel model of computation employing electro optical devices is developed. Parallel techniques for image computations are developed on this model. Finally, processor time optimal solutions to several low and intermediate level image understanding tasks are designed on orthogonal access parallel architectures. Keywords: Parallel architectures; Parallel algorithms; Latin squares; Image understanding; Array access; Processor time; Optimal solutions; Image labelling; Low level vision. (kr)

DESCRIPTORS: (U) *IMAGE PROCESSING, *PARALLEL PROCESSING, ACCESS, ALGORITHMS, ARCHITECTURE, ARRAYS, COMPUTATIONS, CONSTRUCTION, EFFICIENCY, ELECTROOPTICS, IMAGES, LOW LEVEL, METHODOLOGY, MODELS, OPTICAL EQUIPMENT, OPTIMIZATION, ORTHOGONALITY, PARALLEL ORIENTATION,

AD-A223 479 CONTINUED

PROCESSING EQUIPMENT, SOLUTIONS(GENERAL), TIME, VISION.

AD-A223 476 12/6 20/4

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION HAMPTON VA LANGLEY RESEARCH CEN TER

(U) The Development and Evaluation of Numerical Algorithms for MIMD Computers.

DESCRIPTIVE NOTE: Final rept. 1 Feb 88-31 Jan 90,

JAN 90 12P

PERSONAL AUTHORS: Voigt, Robert G.

CONTRACT NO. AFOSR-88-0117

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-90-0663

UNCLASSIFIED REPORT

ABSTRACT: (U) Two activities were pursued under this grant. The first was a visitor program to conduct research on numerical algorithms for MIMD computers. The program is summarized in the following attachments. Attachment A - List of Researchers Supported; Attachment B - List of Reports Completed; and Attachment C - Reports. The second activity was a workshop on the Control of fluid Dynamic Systems held on March 28-29, 1989. The workshop is summarized in attachments. Attachment D - Workshop Summary; and Attachment E - List of Workshop Participants. (kr)

DESCRIPTORS: (U) *ALGORITHMS, *COMPUTERS, ATTACHMENT, FLUID DYNAMICS.

AD-A223 474 6/5

GEORGIA UNIV RESEARCH FOUNDATION INC ATHENS

(U) Effect of Dosing Vehicles on the Pharmacokinetics of Orally Administered Carbon Tetrachloride in Rats,

90 12P

PERSONAL AUTHORS: Kim, H. J.; Bruckner, J. V.; Dallas, C. E.; Gallo, J. M.

CONTRACT NO. AFOSR-88-0277

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR
TR-90-0669

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Toxicology and Applied Pharmacology, v102 p50-60 1990.

ABSTRACT: (U) Effect of Dosing Vehicles on the Pharmacokinetics of Orally Administered Carbon Tetrachloride in Rats. The primary objectives of this investigation were to determine whether oil and aqueous dosage vehicles alter the pharmacokinetics of orally administered carbon tetrachloride (CCl4) in rats, and to relate vehicle effects on CCl4 absorption and bioavailability to alterations of the acute hepatotoxicity of CCl4 seen in a companion study. Fasted 200- to 230-g male Sprague-Dawley rats with indwelling arterial cannulas received 25 mg CCl4/kg body wt by gavage: in corn oil; As an Emulphor aqueous emulsion; in water; and as pure undiluted chemical. Reprints.

DESCRIPTORS: (U) *CARBON TETRACHLORIDE, *PHARMACOKINETICS, *MEDICINE, CORN, DOSAGE, EMULSIONS, OILS, RATS, VEHICLES, WATER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A4.

AD-A223 473 6/5

GEORGIA UNIV RESEARCH FOUNDATION INC ATHENS

(U) Effect or Oral Dosing Vehicles on the Acute Hepatotoxicity of Carbon Tetrachloride in Rats,

90 18P

PERSONAL AUTHORS: Kim, H. J.; Odend'hal, S.; Bruckner, J. V.

CONTRACT NO. AFOSR-88-0277

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR
TR-90-0668

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Toxicology and Applied Pharmacology, v102 p34-49 1990.

ABSTRACT: (U) Although carbon tetrachloride (CCI4) is of concern as a drinking water contaminant, it has been necessary in most oral toxicity studies to give CCI4 in an oil vehicle due to its limited water solubility. The primary objective of out study was to assess the influence of dosing vehicles on the acute hepatotoxicity of CCI4. Fasted 200- to 230-g rats. A time-course study revealed that corn oil did not delay the onset or time of maximal liver injury by an oral 100 mg/kg dose of CCI4, but did reduce the extent of injury relative to that when the chemical was given undiluted or as an aqueous emulsion. Fasted 200- to 230-g male Sprague-Dawley rats were given 0, 10, 25, 50, 100, 250, 500, or 1000 mg CCI4/kg body wt by gavage: in corn oil; as an aqueous emulsion; as the undiluted chemical; and in the 10 and 25 mg/kg doses only, in water. Reprints. (jes)

DESCRIPTORS: (U) *CARBON TETRACHLORIDE, *LIVER, *TOXIC AGENTS, CONTAMINANTS, CORN, DRINKING WATER, EMULSIONS, OILS, ORAL INTAKE, RATS, REPRINTS, SOLUBILITY, TOXICITY, VEHICLES, WATER, WOUNDS AND INJURIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A4.

AD-A223 472 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Tail and Quantile Estimation for Strongly Mixing Stationary Sequences.

DESCRIPTIVE NOTE: Technical rept.,

APR 90 53P

PERSONAL AUTHORS: Rootzen, Holger; Leadbetter, M. R.; De Haan, L.

REPORT NO. TR-292

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0698

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper primarily concerns the estimation of tail parameters for the marginal distribution F of the terms of a strongly mixing stationary sequence when 1-F(t) decreases exponentially, or is regularly varying as t infinity. The asymptotic properties of the Hill estimator for the exponential parameter or regular variation index are developed within this framework. Estimation procedures are investigated for tail probabilities and tail quantiles, both for the individual terms of the process and for their maxima over groups of consecutive terms. The latter case requires estimation of the so called extremal index, and substantially involves the local dependence structure of the sequence. (kr)

DESCRIPTORS: (U) *ESTIMATES, *PARAMETERS, ASYMPTOTIC SERIES, INDEXES, MIXING, SEQUENCES, STATIONARY, TAIL ASSEMBLIES, VARIATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A223 464 6/5

YORK UNIV TORONTO (ONTARIO) DEPT OF PSYCHOLOGY

(U) Visual Field Defects for Unidirectional and Oscillatory Motion in Depth,

89 12P

PERSONAL AUTHORS: Hong, X.; Regan, D.

CONTRACT NO. F49620-88-C-0002

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-90-0704

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Vision Research, v29 n7 p809-819 1989.

ABSTRACT: (U) Visual fields for oscillatory motion in depth were recorded for 21 subjects. Near fields were different from far fields in 8 and similar in 11 subjects. Visual fields for undirectional motion in depth were recorded for 16 subjects for near and far disparities. Some subjects had fields that differed for approaching versus receding motion in depth and/or for near versus far disparities. In particular, for near disparities, approaching versus receding motion gave fields that were different in 5 and similar in 7 subjects; for far disparities, approaching versus receding motion gave fields that were different in 1 and similar in 10 subjects. For approaching motion in depth, near fields differed from far fields in 3 and were similar in 8 subjects; for receding motion in depth, near fields were different from far fields in 5 and similar in 8 subjects. Because sensitivity to monocular frontal plane motion showed no irregularities corresponding to the stereomotion field defects, we conclude that (1) stereomotion field defects were chiefly due to defective cortical processing of motion. (JES)

DESCRIPTORS: (U) *MOTION, *VISUAL DEFECTS, *SPACE PERCEPTION, FAR FIELD, NEAR FIELD, OSCILLATION, UNIDIRECTIONAL, VISION, DEPTH, VISUAL CORTEX.

IDENTIFIERS: (U) PE61102F, JWUAFOSR2313A5, *Motion perception, *Depth perception, *Visual field defects, Visual fields, Disparity.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A223 463 13/8 12/4

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Supervisory Control of Discrete Event Systems: Supremal Controllable and Observable Languages,

SEP 89 11P

PERSONAL AUTHORS: Kumar, Ratnesh; Garg, Vijay; Marcus, Steven I.

CONTRACT NO. AFOSR-86-0029

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-90-0713

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Annual Allerton Conference on Communication, Control and Computing (27th) p501-510 27-29 Sep 89.

ABSTRACT: (U) This reprint studies the supervisor synthesis problem of a Discrete Event Dynamical System by way of synchronous composition of the plant and the supervisor and discusses some of the resulting controllability issues. An algorithm, that is computationally more efficient than the previously existing ones, is presented for the construction of the minimally restrictive supervisor and shown to be optimal. Closed form representation of the supremal controllable and of the supremal observable sublanguages is also presented. (KR)

DESCRIPTORS: (U) *SYSTEMS ENGINEERING, *PRODUCTION CONTROL, *SUPERVISION, ALGORITHMS, CONTROL, DYNAMICS, REPRINTS, PROBLEM SOLVING, SUPERVISORS, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, *Discrete event systems.

AD-A223 462 12/5 12/3

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Supremal and Maximal Sublanguages Arising in Supervisor Synthesis Problems with Partial Observations,

89 36P

PERSONAL AUTHORS: Cho, Hangju; Marcus, Steven I.

CONTRACT NO. AFOSR-86-0029

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-90-0712

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Mathematical Systems Theory, V22 p177-211 1989.

ABSTRACT: (U) This reprint studies in a unified manner both the class of closed, (Sigma sub u, N) -invariant, and (M,N)-recognizable sublanguages and the class of closed, (Sigma sub u, N)-invariant, and (M, Sigma sub c, N)-controllable sublanguages of a given language L that arise in supervisor synthesis problems of discrete event dynamical systems with partial observations. The supremal element of the former class is often too restrictive, and it is natural to study maximal elements of the latter class. A procedure which computes such a maximal element as a limit of a decreasing sequence of sublanguages of L is presented. Each term of the sequence is shown to be regular if a slightly modified procedure is used. (kr)

DESCRIPTORS: (U) *PROGRAMMING LANGUAGES, *OBSERVATION, DYNAMICS, REPRINTS, SUPERVISORS, SYNTHESIS.

IDENTIFIERS: (U) Pe61102F, WUAFOSR2304A1.

AD-A223 461 6/11

GEORGIA UNIV RESEARCH FOUNDATION INC ATHENS

(U) Influence of Route and Pattern of Exposure on the Pharmacokinetics and Hepatotoxicity of Carbon Tetrachloride,

MAY 90 19P

PERSONAL AUTHORS: Bruckner, J. V.; Kim, H. J.; Muralidhara, S.; Gallo, J. M.

CONTRACT NO. AFOSR-88-0277

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR TR-90-0667

UNCLASSIFIED REPORT

ABSTRACT: (U) Presently, there are many uncertainties in risk assessment of volatile organic compounds (VOCs), due to a paucity of data relevant to human exposure situations. It is unclear whether the relatively large VOC inhalation toxicity data base can be used qualitatively or quantitatively to forecast the consequences of ingestion of the chemicals in food or water. It is also unclear whether the existing VOC oral toxicity data base, which largely consists of bolus gavage studies, is applicable to drinking water hazard evaluation. The objective of our study was to evaluate the influence of route and pattern of exposure on the pharmacokinetics and target organ toxicity of carbon tetrachloride (CCl4). Male Sprague-Dawley rats of 350-400 g inhaled 100 or 1000 ppm CCl4 for 2 hr through a one-way breathing valve. (jes)

DESCRIPTORS: (U) *CARBON TETRACHLORIDE, *LIVER, *PHARMACOKINETICS, *TOXIC AGENTS, CHEMICALS, DATA BASES, DRINKING WATER, EXPOSURE(PHYSIOLOGY), FOOD, HAZARDS, HUMAN BODY, INGESTION(ENGINES), INHALATION, MALES, ORAL INTAKE, ORGANIC COMPOUNDS, ORGANS(ANATOMY), RATS, RESPIRATION, RISK, TARGETS, TEST AND EVALUATION, TOXICITY, VALVES, VOLATILITY, WATER.

AD-A223 460 6/4

YORK UNIV TORONTO (ONTARIO) DEPT OF PSYCHOLOGY

(U) Objective Evidence for Phase-Independent Spatial Frequency Analysis in the Human Visual Pathway,

88 6P

PERSONAL AUTHORS: Regan, D.; Regan, Marian P.

CONTRACT NO. F49620-88-C-0002

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-90-0700

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Vision Research, v28 n1 p187-191 1988.

ABSTRACT: (U) Electrophysiological responses in human index an interaction between responses to two gratings that is relatively independent of the distribution of light in the retinal image. This note addresses the question whether the human visual pathway contains suprathreshold mechanisms that are sensitive to the spatial frequency power spectrum of the retinal image independently of the distribution of light in the retinal image. (JES)

DESCRIPTORS: (U) *ELECTROPHYSIOLOGY, *VISUAL PERCEPTION, DISTRIBUTION, FREQUENCY, GRATINGS(SPECTRA), HUMANS, IMAGES, INDEXES, LIGHT, POWER SPECTRA, RESPONSE, RETINA, SPATIAL DISTRIBUTION.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A223 459 6/4

YORK UNIV DOWNSVIEW (ONTARIO)

(U) Seeing Contour and Colour.

AUG 87 10P

PERSONAL AUTHORS: Kulikowski, J.; Dickinson, C.; Murray, I. J.; Regan, D.

CONTRACT NO. F49620-88-C-0002

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-90-0703

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the International Symposium ofthe Northern Eye Institute (3rd) Manchester, UK, 9-13 Aug 87.

ABSTRACT: (U) An influential idea, first suggested by the Cambridge University group, is that the spatial aspects of retinal image information-pass through parallel psychophysical channels, each of which is tuned to orientation and spatial frequency. This idea has had considerable success in explaining psychophysical data on the ability to distinguish between a grating pattern and a patch of light of the same mean luminance, i.e. grating detection. The spatial frequency bandwidth of the channels has been estimated at about 1.4 octaves, and the orientation bandwidth at 10-20 deg. It is often supposed that these channels are the psychophysical reflection of the orientation and spatial frequency tuning of visual pathway neurons, and many authors have noted the rough agreement between the channel tuning bandwidths and the orientation tuning and spatial frequency tuning bandwidths of the most sharply-tuned cells in monkey V1 visual cortex. Reprints.

DESCRIPTORS: (U) *SPATIAL DISTRIBUTION, *IMAGE PROCESSING, *RETINA, AGREEMENTS, BANDWIDTH, CHANNELS, COLORS, CONTOURS, DETECTION, FREQUENCY, GRATINGS(SPECTRA), LIGHT, LUMINANCE, MEAN, NERVE CELLS, ORIENTATION(DIRECTION), PARALLEL ORIENTATION, PATTERNS,

AD-A223 459 CONTINUED

PSYCHOPHYSICS, REFLECTION, REPRINTS, ROUGHNESS, TUNING, UNIVERSITIES.

IDENTIFIERS: (U) PE61102F, WUAFOAR2313A5.

AD-A223 458 7/6 11/9

AKRON UNIV OH INST OF POLYMER SCIENCE

(U) Structure and Fracture of Highly Cross-Linked Networks,

84 21P

PERSONAL AUTHORS: Lemay, J. D.; Swetlin, B. J.; Kelley, F. N.

CONTRACT NO. F49620-86-C-0032

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-90-0691

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Americal Chemical Society, Symposium Series No. 243, p165-183 1984.

ABSTRACT: (U) Amine cured ecoxy networks were investigated to determine the effect of cross-link density on fracture toughness and other properties. Two series of networks were studied: the first having Mc (the average molecular weight of a network chain) controlled by the amine/epoxy reactant ratio; the second controlled by the average molecular weight of several homologous difunctional epoxy prepolymers. Expected topological variations of the first series were confirmed by Tg differences and soluble fractions. The second series was presumed to display only Mc variations. Cross-link densities were characterized above Tg by equilibrium modulus measurements employing rubber elasticity theory. The results indicate that this method yields surprisingly reasonable values. Glassy fracture energies of both network series showed an Mc dependence when ductile yielding of the crack tip preceded crack propagation. (JES)

DESCRIPTORS: (U) *CROSSLINKING(CHEMISTRY), *EPOXY COMPOUNDS, *FRACTURE(MECHANICS), *POLYMERS, *TOUGHNESS, AMINES, CHAINS, CRACK PROPAGATION, CRACKS, DENSITY, ELASTIC PROPERTIES, ENERGY, GLASS, MOLECULAR WEIGHT, NETWORKS, RATIOS, REACTANTS(CHEMISTRY), RUBBER, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A223 455 7/4

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Silicon Dimer Formation by Three-Body Recombination,

MAY 90 10P

PERSONAL AUTHORS: Martin, David L.; Raff, Lionel M.; Thompson, Donald L.

CONTRACT NO. AFOSR-89-0085

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-90-0722

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics v92 n9 p5311-5318, 1 May 90.

ABSTRACT: (U) The rates and dynamics of three-body thermal recombination of silicon atoms to form dimers is investigated at temperatures of 800, 1000, and 1200 K with Ar and Si atoms acting as the third body. A previously reported global potential-energy surface fitted to the results of ab initio calculations at the MP4/6-31G* level and experimental data are employed for the (Si,Si,Si) system. A simple, pairwise potential is used for the (Ar,Si,Si) system. The weak temperature dependence is characterized by an activation energy of 1.2 kcal/mol. When silicon is the third body, the rates are more than an order of magnitude larger due to the increased interaction and the opening of a complex formation, channel for recombination. Four mechanistic pathways leading to recombination are identified. These are direct energy exchange, direct atom exchange; complex formation, and metastable formation due to a rotational barrier. For the (Si,Si,Si) system at 800 K, the contributions of these pathways to the total recombination rate are: direct energy and atom exchange (65.5%), complex formation (6.5%), and metastable formation (28%). Internal energy distributions for product Si2 dimers are reported. In every case, these distributions exhibit a prominent maximum at the Si2 dissociation threshold. The falloff at energies below the maximum reflects the expected exponential distribution of translational energies in unimolecular dissociation processes. The distributions for the (Si,Si,Si) system are broader than those obtained when Ar is the third body. This increased breadth is interpreted to be due to the increased interaction and complex formation that is not present for the (Ar,Si,Si) system. Reprints. (jhd)

DESCRIPTORS: (U) *DIMERS, *SILICON, ACTIVATION ENERGY, ATOMS, BARRIERS, DISSOCIATION, DISTRIBUTION, DISTRIBUTION FUNCTIONS, DYNAMICS, ENERGY, ENERGY TRANSFER, EXCHANGE, EXPERIMENTAL DATA, EXPONENTIAL FUNCTIONS, INTERNAL, LOW STRENGTH, METASTABLE STATE, MOLECULES, RATES, RECOMBINATION REACTIONS, REPRINTS, MOLECULAR ROTATION, THERMAL PROPERTIES.

IDENTIFIERS: (U) Ab initio calculations.

AD-A223 454 7/4

ILLINOIS UNIV AT URBANA

(U) Pyridine Adsorption on Polycrystalline Platinum Studied by the Radioactive-Labeling Method.

DESCRIPTIVE NOTE: Rept. for May 88-Apr 90,

90 5P

PERSONAL AUTHORS: Krauskopf, E. K.; Rice-Jackson, L. M.; Wieckowski, A.

CONTRACT NO. AFOSR-89-0368

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-90-0724

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Langmuir v6 p970-973, 1990.

ABSTRACT: (U) The adsorption of pyridine on a polycrystalline platinum electrode was measured by using a radioactive-labeling technique. The potential dependence and concentration dependence of adsorption were measured in 0.1 M HCIO4, and two exchange experiments were performed. The potential dependence revealed behavior typical for a strongly adsorbed organic species; a broad plateau of maximum adsorption occurs in the double-layer region with decreased adsorption toward potential extremes. No exchange of surface species with added unlabeled solution pyridine occurred at 0.2 V (vs Ag/AgC1, M C1-), but slow exchange was observed at 0.2V over about 2 h; slow hydrogenation is the most likely cause of the loss of adsorbate at this potential. Two different concentration dependence profiles were observed depending on the treatment of the platinum electrode surface; a clean surface gave consistently higher packing densities as a function of pyridine concentration than one that had been pretreated at .000001 M. The observed packing densities correspond to horizontally oriented pyridine, formed at low concentrations, and vertically oriented pyridine, formed at high concentrations. Reprints. (JHD)

AD-A223 454

AD-A223 454 CONTINUED

DESCRIPTORS: (U) *ADSORPTION, *PLATINUM, *PYRIDINES, CONCENTRATION(COMPOSITION), ELECTRODES, HIGH RATE, HORIZONTAL ORIENTATION, HYDROGENATION, LAYERS, LOW LEVEL, PACKING DENSITY, POLYCRYSTALLINE, REGIONS, REPRINTS, SOLUTIONS(GENERAL), SURFACES, VERTICAL ORIENTATION, RADIOACTIVE MATERIALS, TRACER STUDIES, EXCHANGE REACTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A223 453 7/4

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Structural and Dynamical Properties of the Sol-Gel Transition.

DESCRIPTIVE NOTE: Rept. for 1 Nov 89-31 May 90,

90 9P

PERSONAL AUTHORS: Winter, R.; Hua, D. W.; Song, X.; Mantulin, W.; Jonas, J.

CONTRACT NO. AFOSR-89-0099

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-90-0721

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry v94 n6 p2706-2713, 1990.

ABSTRACT: (U) A variety of experimental techniques (multinuclear NMR, Raman, fluorescence polarization, small-angle neutron scattering, viscosity, turbidity, static and dynamic light scattering experiments) have been employed to investigate the nature of the sol-gel transition of tetramethoxysilicate Si(OCH3) 4(TMOS). These experiments probe changes in structural and dynamical properties at the macroscopic and microscopic levels in the course of the sol-gel transition. The experimental results are compared with recent theories for the gelation process. The experiments show that no drastic change in structure occurs at the gelation threshold of TMOS. The formed silica network exhibits a self-similar structure, and the gross features of the sol-gel transition of TMOS can be described within the framework of percolation theory. The underlaying growth process might be classified as reaction-limited cluster-cluster growth. However, the detailed chemical structure and reactivity of the reactants, e.g., the time-dependent functionality of the monomers during the hydrolysis step, also play an important role and have to be taken into account for a more quantitative theoretical description

AD-A223 453 CONTINUED

of this gelation process. Keywords: Sol Gel process, Tetramethoxysilicate, Raman, Fluorescence polarization, Viscosity, Reprints, Reprints. (JHD)

DESCRIPTORS: (U) *FLUORESCENCE, *GELATION, *GELS, *POLARIZATION, *PHASE TRANSFORMATIONS, *SOLUTIONS(GENERAL), ANGLES, DYNAMIC TESTS, DYNAMICS, EXPERIMENTAL DATA, EXPERIMENTAL DESIGN, GROWTH(GENERAL), HYDROLYSIS, LIGHT SCATTERING, METHODOLOGY, MOLECULAR STRUCTURE, MONOMERS, NETWORKS, NEUTRON SCATTERING, PERCOLATION, PROBES, REACTANTS(CHEMISTRY), REACTIVITIES, REPRINTS, SILICON DIOXIDE, STRUCTURAL PROPERTIES, THEORY, THRESHOLD EFFECTS, TURBIDITY, VISCOSITY.

IDENTIFIERS: (U) Sildcate/Tetramethoxy.

AD-A223 439 4/1

UNIVERSITY COLL LONDON (UNITED KINGDOM) DEPT OF PHYSICS AND ASTRONOMY

(U) Atmospheric Structure & Variability.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-30 Nov 89.

MAR 90 9P

PERSONAL AUTHORS: Rees, David; Fuller-Rowell, Timothy J.

CONTRACT NO. F49620-87-C-0096

MONITOR: AFOSR
TR-90-07

UNCLASSIFIED REPORT

ABSTRACT: (U) The contract has supported an extensive programme of atmospheric and ionospheric modelling, aimed at examining Atmospheric Structure and Variability, using the CRAY XMP-48 and the CRAY 2S machines. A technique of forcing tidal and other natural atmospheric fluctuations at the lower boundary of the present version of the 3-dimensional, time-dependent global thermosphere-ionosphere model has been developed. Also, a series of numerical studies have been carried out into the modelled response of the thermosphere during a series of geomagnetic storms in 1981 and 1982, observed by the Dynamics Explorer-2 spacecraft. Further studies have concentrated on using these models for studies of thermosphere - ionosphere coupling, atmospheric density, lower atmospheric tides, participation in the analysis and interpretation of empirical data obtained during the 'Lower Thermosphere Coupling Study', the mid- and low-latitude ionospheric effects of geomagnetic storms, and for studies of the solar activity and geomagnetic activity causes of variations of lower thermospheric atomic oxygen and nitric oxide densities. Keywords: Atmospheric density, Atmospheric tides, Ionosphere-thermosphere coupling, Geomagnetic storm effects, Atomic oxygen, Nitric oxide, Great Britain. (JHD)

DESCRIPTORS: (U) *IONOSPHERIC MODELS, *MAGNETIC STORMS, *ATMOSPHERE MODELS, *COMPUTERIZED SIMULATION, ATMOSPHERIC DENSITY, ATMOSPHERIC TIDES, BOUNDARIES, COUPLING(INTERACTION), ATMOSPHERIC DENSITY, GEOMAGNETISM, GREAT BRITAIN, IONOSPHERE, NITROGEN OXIDES, NUMERICAL

AD-A223 439 CONTINUED

ANALYSIS, SOLAR ACTIVITY, THERMOSPHERE.

IDENTIFIERS: (U) Cray-2S computerized, Cray-SMP computers.

AD-A223 430 9/3 20/5

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(U) Laser System for Developing a New Type of Atom Trap (DURIP).

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-31 Mar 90,

MAY 90 2P

PERSONAL AUTHORS: Kleppner, Daniel

CONTRACT NO. AFOSR-89-0188

PROJECT NO. 3842

TASK NO. A6

MONITOR: AFOSR
TR-90-0727

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant is for instrumentation of a laser system for use in developing a new type of atomic trap, an atomic hydrogen trap that operates in the microkelvin regime. The laser system is designed to provide radiation at 243 nm in order to drive the 1S to 2S two-photon transition in atomic hydrogen. The system is based on a Coherent Model 699-21 Dye Laser, that is driven by a Model 200-K3 krypton ion laser. This generates 488 nm radiation which is frequency doubled in an external ring cavity. The system has been assembled and successfully operated. It delivers 5 mW of 243 nm radiation, which is, to our knowledge, a new record. The laser has been stabilized against cavity with a spectral noise of less than 2Hz. The laser system purchased under this grant is a vital component of our program to study hydrogen at ultra low temperatures, and also to carry forward laser spectroscopy to new regimes of precision. (JHD)

DESCRIPTORS: (U) *LASER APPLICATIONS, *RADIATION PRESSURE, *TRAPPING(CHARGED PARTICLES), ATOMIC STRUCTURE, ATOMS, CAVITIES, DRIVES, EXTERNAL, FORWARD AREAS, HYDROGEN, LOW TEMPERATURE, NOISE, RINGS, SPECTRA, SPECTROSCOPY, ATOMIC BEAMS.

AD-A223 430 CONTINUED

IDENTIFIERS: (U) Atomic traps.

AD-A223 423 7/3 7/4

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) High Pressure NMR Study of Transport and Relaxation in Complex Liquids of 2-Ethylhexyl Cyclohexanecarboxylate and 2-Ethylhexyl Benzoate.

DESCRIPTIVE NOTE: Rept. 1 Nov 89-31 May 90,

90 10P

PERSONAL AUTHORS: Jonas, J.; Adamy, S. T.; Grandinetti, P. J.; Masuda, Y.; Morris, S. J.

CONTRACT NO. AFOSR-89-0099

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-90-0720

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v94 p1157-1164, 1990.

ABSTRACT: (U) The self-diffusion coefficients, densities, and shear viscosities of liquid 2-ethyl-hexyl cyclohexanecarboxylate (EHC) were measured as a function of pressure from 1 to 4500 bar within the temperature range from -20 to 80 deg C. The Stokes-Einstein equation is applicable over 5 order of magnitude changes in self-diffusion and viscosity. The experimental data obtained are compared to those for the complex liquid of 2-ethylhexyl benzoate (EHB) in order to characterize the molecular structure effect of the replacement of the benzene ring with a saturated cyclohexyl ring. In particular, the low-temperature data suggest that conjugation of the phenyl ring with the ester group in EHB slows down diffusion and increases viscosity in comparison with EHC. Analysis in terms of the rough hard sphere model indicates a high degree of rotational-translational coupling which increases as density increases. Keywords: Diffusion, Viscosity, High pressure, NMR, Hydrodynamic equation, Viscous fluids, Reprints, EHC, EHB, Organic compounds, Liquids, Molecular properties, Carbon atoms. (JG)

AD-A223 423

AD-A223 423 CONTINUED

DESCRIPTORS: (U) *DIFFUSION, *DIFFUSION COEFFICIENT, *HIGH PRESSURE, *LIQUIDS, *TRANSPORT, *NUCLEAR MAGNETIC RESONANCE, ATOMS, BENZENE, CARBON, COEFFICIENTS, CYCLOHEXANES, DENSITY, EQUATIONS, ESTERS, EXPERIMENTAL DATA, FLUIDS, HARDNESS, HYDRODYNAMICS, LOW TEMPERATURE, MOLECULAR PROPERTIES, MOLECULAR STRUCTURE, ORGANIC COMPOUNDS, PHENOLS, RANGE(EXTREMES), REPRINTS, RINGS, SATURATION, SHEAR PROPERTIES, SPHERES, TEMPERATURE, VISCOSITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3, NMR, 2-Ethylhexyl cyclohexanecarboxylate, EHC, EHB.

AD-A223 423

AD-A223 422 14/2 13/7 12/7

STANFORD UNIV CA DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Integrated Multiaxial and High Precision Computer Controlled Servohydraulic Mechanical Testing System.

DESCRIPTIVE NOTE: Final rept. 15 Jul 84-14 Jul 85,

FEB 86 4P

PERSONAL AUTHORS: Nix, William D.

CONTRACT NO. AFOSR-84-0276

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-90-0741

UNCLASSIFIED REPORT

ABSTRACT: (U) An electronically controlled, hydraulically actuated multiaxial mechanical testing system has been purchased from MTS and installed in the Peterson Laboratory at Stanford University. The instrument is controlled by a DEC computer. This instrument provided by the grant will permit a kind of mechanical testing to be done at Stanford University. Multiaxial mechanical tests can be done by using the combined tension-torsion capabilities of the new instrument. This will permit not only a more complete investigation of the mechanisms of deformation and fracture than can be done with axial testing alone but also a study of structural material behavior under the complex loading conditions which arise in practice. The torsional testing mode will also permit studies of deformation at large strains, such as those which arise in metal forming operations. (CP)

DESCRIPTORS: (U) *DEFORMATION, *STRESS TESTING, *TEST EQUIPMENT, INSTRUMENTATION, INTEGRATED SYSTEMS, MECHANICAL PROPERTIES, METALWORKING, STRUCTURAL PROPERTIES, TENSION, TEST AND EVALUATION, TORSION, STRESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A3, DEC Computers.

AD-A223 421 14/2 20/12

IOWA STATE UNIV AMES

(U) DoD-URIP Thin Film Deposition Equipment.

DESCRIPTIVE NOTE: Final rept. 1 Sep 83-31 Aug 84,

JUN 86 16P

PERSONAL AUTHORS: Shanks, H. R.

CONTRACT NO. AFOSR-83-0351

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-90-0740

UNCLASSIFIED REPORT

ABSTRACT: (U) A single source ionized cluster beam deposition system was purchased and installed as part of a thin film research facility. The instrument is for a single source ultrahigh vacuum (UHV) ionized cluster beam (ICB) deposition system which was to be coupled by a UHV transfer system to film diagnostics chambers and other deposition systems. (JHD)

DESCRIPTORS: (U) *DEPOSITION, *THIN FILMS, *MOLECULAR BEAMS, CHAMBERS, CLUSTERING, DIAGNOSIS(GENERAL), IONIZATION, RESEARCH FACILITIES, SOURCES, TRANSFER, ULTRAHIGH VACUUM.

IDENTIFIERS: (U) Beam deposition, ICB(Ionized cluster beams).

AD-A223 412 1/1

COLORADO UNIV AT BOULDER

(U) Dynamic Separation: Search for the Cause of Dynamic Stall and Search for Its Control.

DESCRIPTIVE NOTE: Final rept.,

MAY 90 4P

PERSONAL AUTHORS: Freymuth, Peter

CONTRACT NO. AFOSR-88-0241

MONITOR: AFOSR
TR-90-0687

UNCLASSIFIED REPORT

ABSTRACT: (U) Dynamic separation has been investigated for various configurations and forcing dynamics. The details which differentiate 2-D vortex dynamics from those involving 3-D aspects were investigated. In addition, different dynamic stall control strategies have been tested. Keywords: Two-dimensional/three-dimensional flow; Flow separation; Flow visualization; Unsteady flow. (edc)

DESCRIPTORS: (U) *FLOW SEPARATION, *STALLING, AERODYNAMIC CONFIGURATIONS, CONTROL, DYNAMICS, FLOW VISUALIZATION, SEPARATION, STRATEGY, THREE DIMENSIONAL FLOW, TWO DIMENSIONAL FLOW, UNSTEADY FLOW, VORTICES.

IDENTIFIERS: (U) Dynamic stall control.

AD-A223 408 20/12

MICHIGAN UNIV ANN ARBOR HARRISON M RANDALL LAB OF PHYSICS

(U) Nonlinear Optical Studies of the Optical and Electronic Properties of Semiconductor Heterostructures.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-31 Dec 89,

MAY 90 95P

PERSONAL AUTHORS: Steel, Duncan G.

CONTRACT NO. AFOSR-85-0280

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-90-0673

UNCLASSIFIED REPORT

ABSTRACT: (U) Experimental work emphasized demonstrating the use of high resolution frequency domain nonlinear laser spectroscopy for the study of materials, particularly semiconductor heterostructures. The work has demonstrated that cw four-wave mixing spectroscopy provides new information regarding the origin of the nonlinear optical response in semiconductor materials as well as new information about structure and relaxation. A summary of the current progress shows: (1) First experimental observation of an interference effect in the nonlinear optical response in GaAs quantum well structures corresponding to a slow component in the nonlinear optical response. The interference effect is evidence that the exciton resonance frequency is shifted in the presence of the electron hole plasma produced by the ionized exciton. (2) Demonstration of frequency domain nonlinear optical spectroscopy methods for the direct measurement of the ambipolar diffusion coefficient and the electron-hole recombination rate in GaAs quantum well structures. (3) Measurement of the response time in strained quantum well structures where the heavy and light hole exciton overlap in energy. and (4) Use of precision nonlinear optical spectroscopy methods for the study of phonon induced spectral diffusion of the heavy

AD-A223 408 CONTINUED

hole exciton at low temperature in GaAs quantum well structures. Keywords: Semiconductor junctions; Nonlinear optical analysis. (cp)

DESCRIPTORS: (U) *EXCITONS, *NONLINEAR ANALYSIS, *HETEROJUNCTIONS, *OPTICAL ANALYSIS, *QUANTUM ELECTRONICS, DIFFUSION, ELECTRONICS, ELECTRONS, GALLIUM ARSENIDES, HOLES(ELECTRON DEFICIENCIES), INTERFERENCE, MATERIALS, MEASUREMENT, NONLINEAR SYSTEMS, OBSERVATION, PHONONS, RATES, REACTION TIME, RECOMBINATION REACTIONS, RESONANT FREQUENCY, RESPONSE, SEMICONDUCTORS, SPECTRA, STRUCTURES.

IDENTIFIERS: (U) PE61102F, WUAFORS2301A1, Semiconductor heterostructure, Four Wave Mixing, Quantum Wells.

AD-A223 372 11/9

AKRON UNIV OH INST OF POLYMER SCIENCE

(U) Structure and Ultimate Properties of Epoxy Resins,

86 35P

PERSONAL AUTHORS: LeMay, J. D.; Kelley, F. N.

CONTRACT NO. F49620-86-C-0032

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-90-0690

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Advances in Polymer Science, v78 p125-148 1986.

ABSTRACT: (U) Common epoxy thermosets are glassy at ambient temperatures and are characterized by a densely crosslinked microstructure. Under normal use conditions they generally fail by brittle fracture mechanisms. The influence of network microstructure on glassy fracture is largely undetermined in spite of a sizeable literature. This can be attributed to a lack of studies on structurally characterized networks and the often complicated microstructure of typical epoxy systems. To address these problems we examine structure-fracture relationships in simple epoxy systems whose structural variables are systematically controlled. Densely crosslinked networks may be characterized by equilibrium modulus measurements above Tg. Application of rubber elasticity theory yields very reasonable average network chain molecular weights (Mc); surprising in view of the expected non-Gaussian character of short epoxy network chains. Rubbery fracture energy increases with Mc when compared at equivalent temperatures above Tg. (JES)

DESCRIPTORS: (U) *EPOXY COMPOUNDS, BRITTLENESS, CHAINS, CROSSLINKING(CHEMISTRY), ELASTIC PROPERTIES, ENERGY, EPOXY RESINS, FRACTURE(MECHANICS), GLASS, MICROSTRUCTURE, MOLECULAR WEIGHT, NETWORKS, RUBBER, SHORT RANGE(TIME), STRUCTURAL PROPERTIES, TEMPERATURE, THEORY, VARIABLES, YIELD.

AD-A223 372 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A223 371 4/1

LOCKHEED MISSILES AND SPACE CO INC PALO ALTO CA

(U) Longitude and Temporal Variations of Energetic Electron Precipitation Near the Trapping Boundary,

APR 90 12P

PERSONAL AUTHORS: Imhof, W. L.; Mobilia J.; Datlowe, D. W.; Voss, H. D.; Gaines, E. E.

CONTRACT NO. F49620-88-C-0072

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-90-0706

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v95 nA4 p3829-3839, 1 Apr 90.

ABSTRACT: (U) Electron precipitation occurring at latitudes near the midnight trapping boundary was measured remotely with a satellite-borne x ray imager (> 21 keV). This investigation has demonstrated for the first time the repetitive mapping of precipitation at the trapping boundary with x rays. The satellite spin motion (5.5 second period) provided repeated scans of each scene during a single pass of the satellite. When the in situ electron precipitation, measured directly with a spectrometer (>68 keV) on the same satellite, was limited to a narrow region at the trapping boundary the precipitation inferred from the x rays was generally fairly uniform over a median longitude interval of at least 45 deg. Significant decreases if x rats at longitudes away from the satellite crossing seldom occurred, but significant increases at certain longitudes were sometimes observed. The widespread arc patterns of the precipitation have important implications for both understanding the nature of the responsible loss mechanisms and for assessing the atmospheric effects. Reprints. (JHD)

DESCRIPTORS: (U) *PRECIPITATION, *ATMOSPHERIC PHYSICS, CROSSINGS, ELECTRONS, ENERGETIC PROPERTIES, INTERVALS,

AD-A223 371 CONTINUED

LONGITUDE, REPRINTS, SPECTROMETERS, SPINNING(MOTION), TIME INTERVALS, X RAYS, TRAPPING(CHARGED PARTICLES), SCIENTIFIC SATELLITES.

IDENTIFIERS: (U) *Electron precipitation.

AD-A223 365 21/2 20/4

SIBLEY SCHOOL OF MECHANICAL AND AEROSPACE ENGINEERING
ITHACA NY

(U) Straining and Scalar Dissipation on Material Surfaces in Turbulence: Implications for Flamelets.

90 28P

PERSONAL AUTHORS: Yeung, P. K.; Girimaji, S. S.; Pope, S. B.

CONTRACT NO. AFOSR-88-0052

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-90-0678

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Combustion and Flame, v79 p340-365 1990.

ABSTRACT: (U) Direct numerical simulations of turbulence are used to examine the straining on material surfaces, and the behavior of thin diffusive layers. The results are related to questions arising in the study of turbulent premixed and diffusion flames in the flamelet regime. The simulations are of constant-density, homogeneous, isotropic turbulence, with artificial forcing of the velocity field to maintain statistical stationarity. Taylor-scale Reynolds number up to 93 are achieved. It is found that the total rate-of-strain a in the tangent plane of a material surface is positive (i.e., extensive) with 80% probability. This straining cause the area of the surface to double every 2.5 Kolmogorov time scales tau sub eta. A premixed flamelet can be viewed as a surface that propagates at a speed w (i.e., the local laminar flame speed) relative to the fluid ahead. It is shown that the distance z between such a propagating surface and an initially coincident material surface remains small if w is small compared to the Kolmogorov velocity scale. For this case, the statistics of z are characterized. Subject to certain assumptions, the thin diffusive layers between blobs of fluid of different concentration adopt a self-similar form (at least for

AD-A223 365 CONTINUED

small times). It is found that the scalar dissipation in the center of these layers is approximately log-normally distributed. The mean thickness of these layers is approximately 2 Batchelor scales, and is less than 5 Batchelor scales with 98% probability. Reprints. (JHD)

DESCRIPTORS: (U) *FLAMES, *TURBULENCE, DISSIPATION, HOMOGENEITY, ISOTROPISM, LAMINAR FLOW, MEAN, MIXING, NUMERICAL ANALYSIS, REPRINTS, SCALAR FUNCTIONS, SURFACES, THICKNESS, VELOCITY, FLAME PROPAGATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A223 334 12/3

ALBERTA UNIV EDMONTON DEPT OF STATISTICS AND APPLIED PROBABILITY

(U) Integration by Parts and the Malliavin Calculus,

89 12P

PERSONAL AUTHORS: Elliott, Robert J.; Kohlmann, Michael

CONTRACT NO. AFOSR-86-0332

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-90-0592

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Lecture Notes in Control and Information Science, v126 p128-139, 1989.

ABSTRACT: (U) From a very simple representation of the integrand in the integral representation of a martingale, we derive an integration by parts formula. This is used to give a new proof of the existence of a density of a diffusion process under the hypothesis that the inverse of the Malliavin matrix is in some L sub p-space, a result implied by Hormander's condition H1. Following Malliavin's original proof of this result there have been other approaches to what is now known as Malliavin's calculus, including those of Stroock, Shigekawa, Bismut, Bichteler and Fonken, and Norris. The main simplification in this paper is the observation that no infinite dimensional calculus of variations is required. This calculus can be replaced by ordinary differentiation in finite dimensional spaces. (KR)

DESCRIPTORS: (U) *CALCULUS OF VARIATIONS, *NUMERICAL INTEGRATION, DIFFUSION, FORMULATIONS, HYPOTHESES, INTEGRALS, PARTS, SIMPLIFICATION, SIZES(DIMENSIONS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, *Martingales, *Malliavin calculus.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI268

AD-A223 331 6/3

YORK UNIV NORTH YORK (ONTARIO)

(U) A Frequency Domain Technique for Characterizing Nonlinearities in Biological Systems.

88 26P

PERSONAL AUTHORS: Regan, M. P.; Regan, D.

CONTRACT NO. F49620-88-C 0002

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-90-0705

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. Theor. Biol. v133 p293-317 1988.

ABSTRACT: (U) Response asymmetry (e.g. to light ON vs. OFF), a frequently encountered property of neurons at both peripheral and central levels in sensory pathways, can be modelled as a rectifier. We describe a double Fourier series method for obtaining the amplitudes and phases of these components for physiologically relevant neural models including (1) compressive, linear, accelerating and mixed compressive/accelerating single model neurons, (2) a cascaded series of model neurons and (3) the parallel/cascaded case corresponding to dichoptic or dichotic stimulation. If one of the inputs is held constant while the other's amplitude is varied, we obtain a family of curves-one for each component. The family of curves seems to be characteristic of the particular non-linear system. Neural models may be tested by first calculating the family of curves and then comparing these theoretical data with a physiologically measured family of curves. (jes)

DESCRIPTORS: (U) *NERVE CELLS, *ANATOMICAL MODELS, *MATHEMATICAL MODELS, ASYMMETRY, COMPUTATIONS, FOURIER SERIES, FREQUENCY, NERVOUS SYSTEM, NONLINEAR SYSTEMS, RESPONSE(BIOLOGY), STIMULATION(GENERAL).

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5, *Neural models.

AD-A223 331

AD-A223 321 21/4

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MECHANICAL ENGINEERING

(U) Fuel Structure and Pressure Effects on the Formation of Soot Particles in Diffusion Flames.

DESCRIPTIVE NOTE: Annual rept. 15 Jan 89-15 Jan 90,

MAY 90 67P

PERSONAL AUTHORS: Santoro, Robert J.

CONTRACT NO. AFOSR-87-0145

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-90-0686

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies emphasizing the effects of fuel concentration and operating pressure on the formation of soot particles have been conducted in a series of laminar diffusion flames. These experiments have shown that fuel concentration has a measurable effect on the amount of soot formed in the flame. However, a simple, constant proportionality between the fuel concentration and soot volume fraction has not been found to apply for the range of flow conditions studied. This observation is believed to be a result of flame residence time and diffusion effects which mitigate the consequences of reduced initial fuel concentration. Comparisons with simple laminar diffusion flame models are currently being used to investigate the relationship between initial fuel concentration and local flame concentration fields. Similar studies of soot formation in laminar diffusion flames as a function of operating pressure have also been completed for ethene, ethane and propene fuel species. Keywords: Soot formation, Soot particles, Diffusion flames. (JES)

DESCRIPTORS: (U) *FUELS, CONCENTRATION(COMPOSITION), DIFFUSION, ETHANES, FLAMES, FLOW, LAMINAR FLOW, MEASUREMENT, PARTICLES, PRESSURE, PROPENES, SOOT, VOLUME.

AD-A223 321

AD-A223 321 CONTINUED

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F.

AD-A223 318 7/6

AKRON UNIV OH INST OF POLYMER SCIENCE

(U) Use of Parametric Models in Designing Polymeric Materials to Specifications,

89 15P

PERSONAL AUTHORS: Von Meerwall, E.; Kelley, F. N.

CONTRACT NO. F49620-86-C-0032

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-90-0689

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fracture, v39 p79-92 1989.

ABSTRACT: (U) In an effort to organize the design of polymeric materials, we have devised guidelines for analytically modeling the behavior of such materials as function of two independent variables such as rate and temperature. The parameters of successful models should have physical significance in terms of molecular theories or other measurements, and may be optimized by least-squares fits to appropriate data. Specimens may be compared by studying the variations of the fitted model parameters with sample constitution or preparation. We describe the implementation of this procedure on a computer graphics facility, and illustrate its use in the analysis of tear energy in filled polybutadiene networks. We envision an extension of this methodology to permit quantitative prediction of ingredients and treatment needed to produce materials of desired properties. Reprints.(JES)

DESCRIPTORS: (U) *POLYMERS, COMPUTER GRAPHICS, ENERGY, FACILITIES, FILLING, LEAST SQUARES METHOD, MATERIALS, MATHEMATICAL MODELS, MODELS, MOLECULES, NETWORKS, OPTIMIZATION, PARAMETERS, PARAMETRIC ANALYSIS, POLYBUTADIENE, PREDICTIONS, SPECIFICATIONS, TEARING, THEORY.

AD-A223 321

AD-A223 318

AD-A223 318 CONTINUED

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F.

AD-A223 317 7/6

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Large Optical Birefringence in Poly(p-phenylene vinylene) Films Measured by Optical Waveguide Techniques,

90 5P

PERSONAL AUTHORS: Burzynski, Ryszard; Prasad, Paras N.; Karasz, Frank E.

CONTRACT NO. F49620-87-C-0042

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-90-0688

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer, v31 p627-630 1990.

ABSTRACT: (U) Organic polymeric systems are emerging as an important class of optical materials for photonics applications. Polymeric systems offer two main advantages. First, their flexibility to be fabricated in forms of films or fibres of optical quality makes them suitable for integrated-optics device structures. Secondly, conjugated polymeric structures exhibit large non-resonant (non-absorptive) third-order optical non-linearity, which leads to intensity dependence of refractive index. This intensity dependence of refractive index is what forms the basis for ultrafast all-optical switching and optical processes in polymers, therefore, is at the forefront of modern research because of the prospect of optical processing with speeds in the subpicosecond range. Concentrated efforts are being placed on the measurements of non-linear optical behaviour in organic polymeric materials. Reprints. (JES)

DESCRIPTORS: (U) *POLYMERS, BEHAVIOR, BIREFRINGENCE, FIBERS, INTENSITY, METHODOLOGY, NONLINEAR SYSTEMS, OPTICAL MATERIALS, OPTICAL PROCESSING, OPTICAL PROPERTIES, OPTICAL WAVEGUIDES, OPTICS, ORGANIC MATERIALS, REFRACTIVE INDEX, REPRINTS, RESONANCE, STRUCTURES.

AD-A223 317 CONTINUED

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F.

AD-A223 305 7/4 11/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MATERIALS SCIENCE AND ENGINEE RING

(U) Surface Chemistry and Structural Effects in the Stress Corrosion of Glass and Ceramic Materials.

DESCRIPTIVE NOTE: Final rept. 1 May-31 Dec 89,

MAY 90 23P

PERSONAL AUTHORS: Pantano, Carlo G.; Gonzalez, Armando

CONTRACT NO. F49620-88-C-0074

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-90-0711

UNCLASSIFIED REPORT

ABSTRACT: (U) The phenomena termed fractoemission was monitored in soda-lime-silica glass specimens during slow crack growth. No electron, ion, or photon signals were detected until crack velocities reached approximately (0.01 meters per second). These observations suggest that the more intense fractoemissions observed during fast fracture are due to dissipation of the excess energy associated with unstable crack growth, but more significantly that fractoemissions are not fundamental to crack propagation in glass. Keywords: Surface chemistry, Structural effects of glass and ceramic materials, Stress corrosion, Physical chemistry. (jg)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *GLASS, *STRESS CORROSION, *STRUCTURAL PROPERTIES, *SURFACE CHEMISTRY, CRACK PROPAGATION, CRACKS, ELECTRONS, FRACTURE(MECHANICS), GROWTH(GENERAL), PHOTONS, PHYSICAL CHEMISTRY, SIGNALS, STABILITY, VELOCITY.

IDENTIFIERS: (U) Fractoemission, Soda-lime-silica glass specimens, PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A223 283 5/6 5/9

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force High School Apprenticeship Program: 1989 Program Management Report. Volume 3.

DESCRIPTIVE NOTE: Annual rept.,

DEC 88 528P

PERSONAL AUTHORS: Darrah, Rodney C.; Cavender, Claude

CONTRACT NO. F49620-88-C-0053

PROJECT NO. 2305

TASK NO. D5

MONITOR: AFOSR
TR-90-0659-VOL-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A223 282.

ABSTRACT: (U) In the near future the United States may face shortages of scientists and engineers in fields such as physics, electronic engineering, computer science and aeronautical engineering. High School students are currently not selecting to prepare for careers in these areas in numbers large enough to match the projected needs in the United States. The Air Force faces 'formidable challenge - the acquisition and retention of the technological competence needed to ensure a strong national security, both-in-house and in the industrial and academic base which supports defense preparedness.' The Director of the Office and Science of Technology Policy in the Executive Office of the President in 1979 responded to this need by requesting the federal agencies to incorporate in their contract research programs the mechanisms to stimulate career interests in science and technology in high school students showing promise in these areas. The Air Force High School Apprenticeship Program is an example of the response to this. (jes)

DESCRIPTORS: (U) *CAREERS, *SCHOOLS, *STUDENTS, ACQUISITION, AERONAUTICAL ENGINEERING, COMPUTERS, CONTRACTS, ELECTRONICS, ENGINEERING, EXECUTIVES, INDUSTRIES, NATIONAL SECURITY, PHYSICS, POLICIES,

AD-A223 283 CONTINUED

RESEARCH MANAGEMENT, SECONDARY, UNITED STATES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305D5.

AD-A223 282 5/1

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force High School Apprenticeship Program: 1989 Program Management Report. Volume 2.

DESCRIPTIVE NOTE: Annual rept.,

DEC 89 604P

PERSONAL AUTHORS: Darrah, Rodney C.; Cavender, Claude

CONTRACT NO. F49620-88-C-0053

PROJECT NO. 2305

TASK NO. D5

MONITOR: AFOSR
TR-90-0660-VOL-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 3, AD-A223 283.

ABSTRACT: (U) In the near future the United States may face shortages of scientists and engineers in fields such as physics, electronic engineering, computer science and aeronautical engineering. High School students are currently not selecting to prepare for careers in these areas in numbers large enough to match the projected needs in the United States. The Air Force faces 'a formidable challenge - the acquisition and retention of the technological competence needed to ensure a strong national security, both in-house and in the industrial and academic base which supports defense preparedness.' The Director of the Office and Science of Technology Policy in the Executive Office in the President in 1979 responded to this need by requesting the federal agencies to incorporate in their contract research programs the mechanisms to stimulate career interests in science and technology in high school students showing promise in these areas. The Air Force High School Apprenticeship Program is an example of the response to this. (JES)

DESCRIPTORS: (U) *CAREERS, *SCHOOLS, *STUDENTS, ACQUISITION, AERONAUTICAL ENGINEERING, COMPUTERS, CONTRACTS, ELECTRONICS, ENGINEERING, EXECUTIVES, INDUSTRIES, NATIONAL SECURITY, PHYSICS, POLICIES,

AD-A223 282 CONTINUED

RESEARCH MANAGEMENT, SECONDARY, UNITED STATES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305D5.

AD-A223 281 5/1

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force High School Apprenticeship Program: 1989 Program Management Report. Volume 1.

DESCRIPTIVE NOTE: Annual rept.,

DEC 88 528P

PERSONAL AUTHORS: Darrah, Rodney C.

CONTRACT NO. F49620-88-C-0053

PROJECT NO. 2305

TASK NO. D5

MONITOR: AFOSR
TR-90-0659-VOL-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A223 282.

ABSTRACT: (U) In the near future the United States may face shortages of scientists and engineers in fields such as physics, electronic engineering, computer science and aeronautical engineering. High school students are currently not selecting to prepare for careers in these areas in numbers large enough to match the projected needs in the United States. The Air Force faces 'a formidable challenge - the acquisition and retention of the technological competence needed to ensure a strong national security, both in-house and in the industrial and academic base which supports defense preparedness.' The Director of the Office and Science of Technology Policy in the Executive Office of the President in 1979 responded to this need by requesting the federal agencies to incorporate in their contract research programs the mechanisms to stimulate career interests in science and technology in high school students showing promise in these areas. The Air Force High School Apprenticeship Program is an example of the response to this. (JES)

DESCRIPTORS: (U) *CAREERS, *CONTRACTS, ACQUISITION, AERONAUTICAL ENGINEERING, COMPUTERS, ELECTRONICS, ENGINEERING, EXECUTIVES, INDUSTRIES, NATIONAL SECURITY, PHYSICS, POLICIES, RESEARCH MANAGEMENT, SCHOOLS,

AD-A223 281 CONTINUED

SECONDARY, STUDENTS, UNITED STATES.

IDENTIFIERS: (U) PE61102F, WUAFORS2305D5.

AD-A223 242 20/4

OHIO STATE UNIV COLUMBUS DEPT OF ELECTRICAL ENGINEERING

(U) Three-Dimensional Structure of Boundary Layers in Transition to Turbulence.

DESCRIPTIVE NOTE: Final rept. Apr 88-Mar 89,

MAR 89 157P

PERSONAL AUTHORS: Herbert, Thorwald

CONTRACT NO. AFOSR-88-0186

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-90-0728

UNCLASSIFIED REPORT

ABSTRACT: (U) A spectral code for linear stability analysis has been developed that allows easy adaptation to a large variety of basic flows and stability equations. This code is the basis for extensions to analyze secondary and nonlinear stability in parallel and nonparallel flows. Improved numerical techniques have been developed to reduce the computational demand of secondary instability studies. A new approach to convective instability analysis in nonparallel flows on the basis of parabolized stability equations has been developed for incompressible and compressible flows. Encouraging results have been obtained in the areas of linear, nonlinear, and secondary instability. The code appears as a viable alternative to DNS codes that allows transition simulations at a small fraction of the computational cost. Keywords: Transition; Boundary layers; Stability. (jhd)

DESCRIPTORS: (U) *TURBULENCE, BOUNDARY LAYER TRANSITION, CODING, COMPRESSIBLE FLOW, COMPUTATIONS, CONVECTION, COSTS, EQUATIONS, INCOMPRESSIBLE FLOW, LINEAR SYSTEMS, NONLINEAR SYSTEMS, NUMERICAL METHODS AND PROCEDURES, PARABOLAS, SIMULATION, SPECTRA, STABILITY, STRUCTURES, THREE DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A1.

AD-A223 242

AD-A223 211 20/11

NORTHWESTERN UNIV EVANSTON IL TECHNOLOGICAL INST

(U) Micromechanics of Size Effect in Failure Due to Distributed Cracking.

DESCRIPTIVE NOTE: Final rept. 1 Jan 87-31 Dec 89,

FEB 90 540P

PERSONAL AUTHORS: Bazant, Zdenek P.; Beltyschko, Ted

REPORT NO. NU-90-2/498-AR1

CONTRACT NO. F49620-87-C-0030

PROJECT NO. 2302

TASK NO. C2

MONITOR: AFOSR
TR-90-0503

UNCLASSIFIED REPORT

ABSTRACT: (U) An extensive study of the micromechanics aspects and size effects associated with strain softening damage due to distributed cracking in brittle heterogeneous materials such as concrete, rocks and ceramics has been carried out and presented in a sequence of publications. The results may be grouped in five categories: (1) Size Effects, (2) Micromechanics Aspects, (3) Nonlocal Continuum Models, (4) Localization Instabilities, (5) Thermodynamic Analysis of Stable Path, and (6) Numerical Implementation of Localization Limiters. The law governing the size effect due to localization of strain softening into a finite size fracture process zone has been formulated, experimentally verified and calibrated. Knowledge of the size effect law has led to a method of determining nonlinear fracture properties on the basis of maximum loads of geometrically similar specimens of different sizes. The concept of a brittleness number characterizing the proximity of response of any structure to linear elastic fracture mechanics has been developed. Extensive experiments have been conducted on concrete, rock and ceramics. (JES)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *CRACKS, *FRACTURE(MECHANICS), BRITTLENESS.

AD-A223 211

AD-A223 211 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2302C2.

AD-A223 126 5/2

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Research Initiation Program for 1988. Volume 4.

DESCRIPTIVE NOTE: Technical rept.,

APR 90 990P

PERSONAL AUTHORS: Darrah, Rodney C.; Cavender, Claude

CONTRACT NO. F49620-88-C-0053

PROJECT NO. 3484

TASK NO. D5

MONITOR: AFOSR
TR-90-0710

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A223 123.

ABSTRACT: (U) Partial contents: Auditory modeling; Assessing the cognitive demands of tracking strategies; Optimization of the nonlinear discrete parameter model of the seated human spine; In vitro modeling of perfluoro-N-decanoate effects on enzymes of fatty acid metabolism; Investigation of training content validity and training efficiency in the Air Force airmen basic-in-residence training course; Intelligent tool to facilitate development of qualitative process models in novice programmers; Effect of range restriction on correlation coefficient estimation; validation of an enlisted Air Force specialty task taxonomy and cross-AFS ease-of-movement predictions; Proportional intensity reliability analysis for repairable items; Monte Carlo comparison of validity generalization procedures; Graphical programming of simulation models in an object-oriented environment; Refinement considerations for an advanced instructional design advisor; engineering design with decision support -- An application of goal decomposition; Solvent extraction of boron from industrial wastewaters; Comparison of asbestos analysis by SEM-EDXA and TEM-SAED; Examination of Kriging techniques for ground water monitoring; Cortisol prevention of chronic beryllium disease in postpartum rats; Blood flow distribution in

AD-A223 126 CONTINUED

the non-working forearm during exercise. (edc)

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE PERSONNEL, AIR FORCE TRAINING, ADVISORY ACTIVITIES, ARMS(ANATOMY), ASBESTOS, BERYLLIUM, BLOOD CIRCULATION, BORON, COEFFICIENTS, COGNITION, COMPARISON, COMPUTER AIDED DESIGN, COMPUTER GRAPHICS, COMPUTER PROGRAMMING, CORRELATION, CORTISOL, DECISION MAKING, DECOMPOSITION, DISEASES, DISTRIBUTION, EFFICIENCY, ENGINEERING, ENVIRONMENTS, ENZYMES, ESTIMATES, EXERCISE(PHYSIOLOGY), FATTY ACIDS, GROUND WATER, HEARING, HUMANS, IN VITRO ANALYSIS, INSTRUCTIONS, INTENSITY, MATHEMATICAL MODELS, LIPID METABOLISM, MICROSCOPY, MODELS, MONITORING, MONTE CARLO METHOD, NONLINEAR SYSTEMS, OPTIMIZATION, PARAMETERS, PREVENTION, PROGRAMMERS, RATS, RELIABILITY, REPAIR, SIMULATION, SOLVENT EXTRACTION, SPECIALISTS, SPINAL COLUMN, STRATEGY, TOOLS, TRACKING, TRAINING, VALIDATION, WASTE WATER, WASTES(INDUSTRIAL).

IDENTIFIERS: (U) Decanoates, Kriging techniques, PE61102F, WUAFOSR3484D5.

AD-A223 126

AD-A223 125 5/2

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Research Initiation Program for 1988. Volume 3.

DESCRIPTIVE NOTE: Technical rept.,

APR 90 1050P

PERSONAL AUTHORS: Darrah, Rodney C.; Cavender, Claude

CONTRACT NO. F49620-88-C-0053

PROJECT NO. 3484

TASK NO. D5

MONITOR: AFOSR
TR-90-0709

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 4, AD-A223 126.

ABSTRACT: (U) Partial contents: Vaporization behavior of pure and multicomponent fuel droplets in a hot air stream; Vortical structures in a 2-D slot burner-cold flow; Calculations of interface-state occupation function and GaAs/Ge heterostructure solar cell efficiency; Computer simulation of adaptive resource management in real-time; Proving equivalence of high-and low-level architectural descriptions in VHDL; Applications of evolutionary learning strategies to pattern recognition tasks; Effect of roughened surface on turbulent boundary layer separation at Mach 6.0; Stochastic model of fatigue crack growth due to random loading for application to aircraft wheels; Fatigue characteristics of F-16 composite transparency material determined by long-term and accelerated methods; Convergence of upper-bound optimum design of large-scale structures with specified frequency bands; Robustness with positive real controllers for large space structures; Robust eigenstructure assignment for flight control design; Comparative burning rates and duplex loads of solid propellants; Low velocity impact of composite materials; Aircraft availability model -- Feasibility study for POM forecasting; Tunable absorption in doping superlattices; Joining of carbon-carbon composites; Characterization of the phase separation

AD-A223 125

AD-A223 125 CONTINUED

behavior of poly(p-phenylene benzobisthiazole)/Amorphous nylon molecular composites by small angle light scattering. (edc)

DESCRIPTORS: (U) *AIR FORCE RESEARCH, ABSORPTION, ACCELERATED TESTING, ADAPTIVE SYSTEMS, AIR, AIR FLOW, AIRCRAFT, AIRCRAFT MODELS, AMORPHOUS MATERIALS, ANGLES, AVAILABILITY, BURNING RATE, CARBON CARBON COMPOSITES, COMPOSITE MATERIALS, COMPUTERIZED SIMULATION, CRACK PROPAGATION, DOPING, DROPS, EVOLUTION(GENERAL), FATIGUE, FATIGUE(MECHANICS), FEASIBILITY STUDIES, FLIGHT CONTROL SYSTEMS, FLOW SEPARATION, FREQUENCY BANDS, FUNCTIONS, HIGH TEMPERATURE, IMPACT, INTERFACES, JOINING, LATTICE DYNAMICS, LEARNING, LIGHT SCATTERING, LOW VELOCITY, MATHEMATICAL MODELS, MOLECULES, NYLON, PATTERN RECOGNITION, PHASE STUDIES, RESOURCE MANAGEMENT, SEPARATION, SOLAR CELLS, SOLID PROPELLANTS, SPACECRAFT, STOCHASTIC PROCESSES, STRATEGY, STRUCTURES, TRANSPARENCE, TUNING, TURBULENT BOUNDARY LAYER, VAPORIZATION, VORTICES, WHEELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR3484D5.

AD-A223 124 5/2

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Research Initiation Program for 1988. Volume 2.

DESCRIPTIVE NOTE: Technical rept.,

APR 90 604P

PERSONAL AUTHORS: Darrah, Rodney C.; Cavender, Claude

CONTRACT NO. F49620-88-C-0053

PROJECT NO. 3484

TASK NO. D5

MONITOR: AFOSR
TR-90-0708

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 3, AD-A223 125.

ABSTRACT: (U) Partial contents: NMR studies of alkylammonium-chloroaluminate room-temperature electrolytes; Mechanistic studies on the thermal decomposition of NTO by high performance liquid chromatography; Aromatic nitrations in chloroaluminate melts; Calculated C-NO2 bond dissociation energies A MCSCF study of the rearrangement of nitromethane to methyl nitrate; Sodium as an electrode for chloroaluminate; Transient shock waves in a Mach 3 flow; Ab-initio and semi-empirical molecular orbital studies of energetic materials (Nitrogen heterocyclics) and polymers; Radiative association in ion-molecule reactions -- Reactions of some carbon cations; Impulse approximation formalism for atom molecule collisions; Stellar photometry, vehicle glow, and advanced image analysis; Theoretical and observational studies of geomagnetic storm-related ion and electron heating in the subauroral region; Algorithms for generalized exponential inversion; Trajectory calculations of high temperature and kinetic energy dependent ion-polar molecule collision rate constants; Aging studies of GaAs Schottky barriers; Supply line testing in CMOS digital circuits; Characterization of detectors for optical pattern recognition. (edc)

AD-A223 124 CONTINUED

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AGING(MATERIALS), ALGORITHMS, ALUMINATES, AROMATIC COMPOUNDS, ATOMS, CARBON, CATIONS, CHEMICAL REACTIONS, CHLORINE COMPOUNDS, CIRCUITS, COLLISIONS, COMPUTATIONS, OPTICAL DETECTORS, DIGITAL SYSTEMS, DISSOCIATION, CHEMISTRY, ELECTRONS, ENERGETIC PROPERTIES, GALLIUM ARSENIDES, HEATING, NITROGEN HETEROCYCLIC COMPOUNDS, HIGH RESOLUTION, HIGH TEMPERATURE, IMAGE PROCESSING, IONS, LIQUID CHROMATOGRAPHY, MAGNETIC STORMS, MATERIALS, MELTS, METHYL RADICALS, MOLECULAR ORBITALS, MOLECULES, NITRATES, NITRATION, NITROMETHANE, NUCLEAR MAGNETIC RESONANCE, OPTICS, PATTERN RECOGNITION, PHOTOMETRY, POLYMERS, PULSES, PYROLYSIS, RADIATION, SCHOTTKY BARRIER DEVICES, SHOCK WAVES, SODIUM, STARS, SUPPLIES, TEST AND EVALUATION, TRAJECTORIES, TRANSIENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR3484D5.

AD-A223 124

AD-A223 123 5/2

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Research Initiation Program for 1988. Volume 1.

DESCRIPTIVE NOTE: Technical rept.,

APR 90 976P

PERSONAL AUTHORS: Darrah, Rodney C.; Cavender, Claude

CONTRACT NO. F49620-88-C-0053

PROJECT NO. 3484

TASK NO. D5

MONITOR: AFOSR
TR-90-0707

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A223 124.

ABSTRACT: (U) Partial contents: Synergistic effects of bomb cratering; Automated motion parameter determination from an image sequence; Modeling and simulation on microcomputers, 1989; Two dimensional MHD simulation of accelerating arc plasmas; Modeling reactive fragments; Target-aerosol discrimination for active optical proximity sensors; The dynamics of impact; Multigraph kernel for transputer based systems; MTF studies of IR focal plane arrays at low flux levels; Droplet size distributions and combustion modeling in a pintle injector spray; Multiple scattering in solid fuel rocket plumes; Influence of forced disturbances on the vortex core and the vortex burst; Large space structure parameter estimation; Calibration of the infrared spectropolarimeter; Computer code to include core polarization in effective potential basis set expansion studies; Fluorescence spectra of matrix-isolated lithium; Energy-and time-resolved photophysics and photochemistry of high energy cryogenic metal-containing rocket fuels; Experimental verification and development of structural identification techniques on a grid; Experimental investigation of the stability of jets near the critical point; HF network evaluation; High intensity compressive stress wave propagation through unsaturated sands. (edc)

AD-A223 123

AD-A223 123 CONTINUED

DESCRIPTORS: (U) *AIR FORCE RESEARCH, ARRAYS, AUTOMATION, BOMBS, CALIBRATION, CHIPS(ELECTRONICS), COMBUSTION, COMPUTER PROGRAMS, CORES, CRATERING, DETERMINATION, DISTRIBUTION, DROPS, DYNAMICS, EXHAUST PLUMES, EXPANSION, FLUORESCENCE, FLUX DENSITY, FOCAL PLANES, FRAGMENTS, GRIDS, IDENTIFICATION, IMAGES, IMPACT, INJECTORS, ISOLATION, LITHIUM, LOW LEVEL, MAGNETOHYDRODYNAMICS, MATRIX MATERIALS, MICROCOMPUTERS, MICROPROCESSORS, MODELS, MOTION, OPTICAL DETECTORS, PARAMETERS, PHOTOCHEMICAL REACTIONS, PINTLES, POLARIZATION, PROXIMITY DEVICES, REACTIVITIES, ROCKET EXHAUST, SCATTERING, SEQUENCES, COMPUTERIZED SIMULATION, SIZES(DIMENSIONS), SOLID FUELS, SPECTRA, SPRAYS, STRUCTURAL PROPERTIES, SUPERCOMPUTERS, SYNERGISM, TWO DIMENSIONAL, VORTICES.

IDENTIFIERS: (U) PE61102F, WUAFOSR3484D5.

AD-A222 944 4/1

BOSTON UNIV MA

(U) Neutral and Ion Composition Changes in the F Region Over Millstone Hill During the Equinox Transition Study.

DESCRIPTIVE NOTE: Journal article,

APR 90 8P

PERSONAL AUTHORS: Oliver, W. L.

CONTRACT NO. F49620-88-C-0111

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-90-0538

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v95 nA4 p4129-4134, 1 Apr 90.

ABSTRACT: (U) Overhead ionospheric incoherent scatter radar data from Millstone Hill is used to deduce the storm time variations of the thermospheric temperature, O and N2 densities, and F1 region ion composition during the Equinox Transition study of September 17-24, 1984. The measured neutral temperature profile and O density at 400 km altitude is extrapolated to determine O density changes in the lower thermosphere. Using these O densities and the measured electron densities, we deduce the variation of the N2 density. Our initial attempt leads to the deduction of large depletions in both O and N2 in the lower thermosphere. The radar-measured neutral temperatures were contaminated by ion-neutral frictional heating effects during the disturbed periods of the ETS and this served to invalidate neutral density extrapolations made with these temperatures. The height of 50% O+ ion composition in the F1 region and the height of the peak electron density in the ionosphere, are completed and compared. The height of the peak on the distributed days was located in the lower F1 region molecular-ion layer rather than in the F1 region O+ layer. This occurrance has serious consequences for methods of

AD-A222 944 CONTINUED

deducing neutral winds from the height of the F layer, for these methods rely on the peak containing primarily O+ ions. Reprints. (jhd)

DESCRIPTORS: (U) *F REGION, *INCOHERENT SCATTERING, *RADAR REFLECTIONS, *MAGNETIC STORMS, CHEMICAL COMPOSITION, DENSITY, ELECTRON DENSITY, ELECTRONS, EXTRAPOLATION, FRICTION, HEATING, HEIGHT, IONOSPHERE, ION DENSITY, MEASUREMENT, NEUTRAL, PEAK POWER, PEAK VALUES, PROFILES, REPRINTS, TEMPERATURE, THERMOSPHERE, WIND, OXYGEN, NITROGEN.

IDENTIFIERS: (U) WUAFOSR2310A2.

AD-A222 881 20/9

SRI INTERNATIONAL MENLO PARK CA

(U) Support for the Forty-Second Annual Gaseous Electronics Conference Held in Palo Alto, California on 16-20 October 1989.

DESCRIPTIVE NOTE: Final rept.,

MAY 90 222P

PERSONAL AUTHORS: Huestis, D. L.

CONTRACT NO. AFOSR-89-0499

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-90-0644

UNCLASSIFIED REPORT

ABSTRACT: (U) Contents: Diagnostics of Processing Discharges, Hydrocarbon Plasmas, Kinetic Models, Electron Diffusion, Plasma Processing, Heavy Particle and Excited State Collisions, Workshop on the Reference System for RF Plasma Processing Research, Posters, Ionization, Laser Phenomena, Arcs and Glows, Electron and Heavy Particle Collisions, Posters, Ar/Xe Lasers I, Breakdown and Switching, Ar/Xe Lasers II, Cross Section Data I, Fundamental Data from Plasmas, Cross Section II, Posters, Novel Plasmas, Cross Sections I Wish I Knew, Single Wafer Plasma Processing, Collisions Between Atoms, Molecules, and Ions, RF Discharges: Models and Experiments, and Optical Diagnostics. (rh)

DESCRIPTORS: (U) *PLASMAS(PHYSICS), ATOMS, COLLISIONS, CROSS SECTIONS, DIAGNOSIS(GENERAL), DIFFUSION, ELECTRONS, HYDROCARBONS, IONIZATION, IONS, KINETICS, LASERS, MODELS, MOLECULES, OPTICAL ANALYSIS, PARTICLE COLLISIONS, PARTICLES, PROCESSING, RADIOFREQUENCY, WAFERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A222 864 12/3

ALBERTA UNIV EDMONTON DEPT OF STATISTICS AND APPLIED PROBABILITY

(U) Direct Solutions of Kolmogorov's Equations by Stocnastic Flows,

AUG 89 11P

PERSONAL AUTHORS: Elliott, Robert J.; Kopp, P. E.

CONTRACT NO. AFOSR-86-0332

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-90-0591

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Mathematical Analysis and Applications, v142 n1 p26-34, 15 Aug 89.

ABSTRACT: (U) Probabilistic solutions of the Cauchy problem for Kolmogorov's forward and backward equations have been known for many years. Kunita uses stochastic flows associated with forward and backward stochastic differential equations to write down explicit forms of the solutions. In fact he uses both forms simultaneously, in that he requires the backward equation for the forward process to solve the Kolmogorov backward equation, and the forward equation for the backward process to solve the Kolmogorov forward equation. In this note we indicate how solutions of the Kolmogorov equations can be obtained directly by differentiation in the time variable of a family of conditional expectations. This is justified by differentiating inside the conditional expectation, using the properties of stochastic flows. Both the forward and backward Kolmogorov equations are considered. As noted the conditional expectation is a solution of Kolmogorov's equation because the bounded variation term in its semi-martingale representation, using the Ito formula, is zero. Reprints. (jhd)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, CAUCHY PROBLEM, EQUATIONS, FLOW, PROBABILITY, REPRINTS, SOLUTIONS(GENERAL), VARIATIONS.

AD-A222 864

AD-A222 864 CONTINUED

IDENTIFIERS: (U) Martingales, Kolmogorov equations, Backward equations.

AD-A222 863 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On Stable Markov Processes.

90 17P

PERSONAL AUTHORS: Adler, Robert J.; Cambanis, Stamatis; Samorodnitsky, Gennady

REPORT NO. TR-203

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0654

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Stochastic Processes and their Applications, v34 p1-17 1990.

ABSTRACT: (U) Necessary conditions are given for a symmetric alpha-stable (S alpha S) process, 1 < alpha < 2, to be Markov. These conditions are then applied to find Markov or weakly Markov processes within certain important classes of S alpha S processes: time changed Levy motion, scale mixed Gaussian processes, moving averages and harmonizable processes. Two stationary S alpha S Markov processes are introduced, the right and the left S alpha S Ornstein-Uhlenbeck processes. Some of the results are in sharp contrast to the Gaussian case alpha = 2. Reprints. (kr)

DESCRIPTORS: (U) *MARKOV PROCESSES, *STABILITY, CONTRAST, MEAN, MIXING, MOTION, REPRINTS, SCALE, SHARPNESS, STATISTICAL PROCESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A222 863

AD-A222 853 11/2

MCDONNELL DOUGLAS RESEARCH LABS ST LOUIS MO

(U) Growth and Deformation Mechanisms of Refractory Alloy Hybrid Materials.

DESCRIPTIVE NOTE: Final rept. Sep 86-Sep 89,

APR 89 69P

PERSONAL AUTHORS: Sastry, S. M.; Schwartz, D. S.; Bodwen, D. M.; O'Neal, J. E.

REPORT NO. MD-QA052

CONTRACT NO. F49620-86-C-0108

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-90-0547

UNCLASSIFIED REPORT

ABSTRACT: (U) A major challenge in the development of dispersion-hardened alloys is to produce a high volume-fraction of the fine hardening particles. This challenge has been met through the use of Rapid Solidification Technology (RST). Application of RST to titanium alloys can produce oxide-dispersion-strengthened alloys having large volume-fractions of < or = 100 nanometers incoherent oxide dispersoids, and in situ composites containing high-modulus whisker/particulate reinforcements. These titanium alloys are a special class of refractory hybrid materials which have low density, yet have the high-temperature strength and stability required for use as hypersonic aircraft skins and structures. Oxide dispersions in RST Ti (Titanium) alloys are produced by Rapid Solidification Processing (RSP) and subsequent annealing of Ti/rare-earth alloys. Rapid solidification significantly increases the solid solubilities of rare-earth elements in Ti. Annealing causes the rare-earth elements to precipitate and scavenge in terstitial oxygen from the Ti matrix, forming rare-earth oxide dispersoids. Keywords: Titanium alloys, Niobium alloys, Hybrid materials, Refractory materials, Rapid solidification processing, Oxide dispersions,

AD-A222 853

AD-A222 853 CONTINUED

Composites, Whisker reinforcement, Properties. (jg)

DESCRIPTORS: (U) *ALLOYS, *DEFORMATION, *HYBRID SYSTEMS, *MATERIALS, *REFRACTORY METAL ALLOYS, ANNEALING, DISPERSIONS, HARDENING, HIGH TEMPERATURE, HYPERSONIC AIRCRAFT, INCOHERENCE, LOW DENSITY, NIOBIUM ALLOYS, OXIDES, OXYGEN, PARTICLE SIZE, PARTICLES, PRECIPITATES, QUICK REACTION, RARE EARTH ALLOYS, RARE EARTH COMPOUNDS, RARE EARTH ELEMENTS, REFRACTORY MATERIALS, SKIN(STRUCTURAL), SOLIDIFICATION, STRENGTH(MECHANICS), TITANIUM, TITANIUM ALLOYS, COMPOSITE MATERIALS, WHISKER COMPOSITES.

IDENTIFIERS: (U) RST.

IAC NO. MMC-703222

IAC DOCUMENT TYPE: MMCIAC - HARD COPY --

AD-A222 852 12/3

CITY COLL NEW YORK

(U) Consequences of Monotonicity for Markov Transition Functions.

DESCRIPTIVE NOTE: Technical rept.,

FEB 90 47P

PERSONAL AUTHORS: Brown, Mark

REPORT NO. CUNY-MB89-03

CONTRACT NO. AFOSR-89-0083

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0580

UNCLASSIFIED REPORT

ABSTRACT: (U) For an ergodic Markov chain we examine conditions for, and consequences of, monotonicity in time of a certain equation. The work has application to the study of asymptotic exponentiality of first passage time distributions, as well as the computation of separation distance. (kr)

DESCRIPTORS: (U) *MARKOV PROCESSES, *MONOTONE FUNCTIONS, COMPUTATIONS, DISTRIBUTION, EQUATIONS, RANGE(DISTANCE), SEPARATION, TIME, TRANSITIONS.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F, *Markov chains.

AD-A222 770 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On the Prediction Theory of Two-Parameter Stationary Random Fields,

JAN 90 17P

PERSONAL AUTHORS: Kallianpur, G.; Miamee, A. G.

REPORT NO. TR-178, TR-260

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0652

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Multivariate Analysis, v32 n1 p120-149 Jan 90.

ABSTRACT: (U) The reprint develops the spectral theory corresponding to the various time domain Wold decompositions of a discrete two-parameter stationary second-order random field (ssorf). Appropriate Szego-type error formulas are established. Minimality and interpolability are defined for ssorf's and sufficient spectral criteria for these are derived. Partial results are obtained which help to determine, via spectral methods, some of the multiplicities introduced by Kallianpur and Mandrekar in their time domain analysis of ssorf's. Keywords: Second-order stationary random fields; Wold decomposition; Purely nondeterministic spectral decomposition; Concordance; Innovation; Minimality; Multiplicity. (jhd)

DESCRIPTORS: (U) *MATHEMATICAL PREDICTION, *STOCHASTIC PROCESSES, DECOMPOSITION, PARAMETERS, REPRINTS, SPECTRA, STATIONARY, THEORY, TIME DOMAIN, TIME SERIES ANALYSIS.

IDENTIFIERS: (U) World decomposition, PE61102F, WUAFOSR2304A5.

AD-A222 705 20/11

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF ENGINEERING SCIEN CE AND MECHANICS

(U) The Effect of Nonlinearities on Flexible Structures.

DESCRIPTIVE NOTE: Final rept. Jan 86-Sep 89,

FEB 90 58P

PERSONAL AUTHORS: Nayfeh, A. H.; Mook, D. T.

CONTRACT NO. AFOSR-86-0090

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-90-0572

UNCLASSIFIED REPORT

ABSTRACT: (U) The project is a theoretical and experimental investigation into the influence of nonlinearities on flexible structures in the presence of multifrequency parametric and external excitations having independent frequencies and phases and arbitrary amplitudes. The nonlinearities and excitations may appear in the governing equations, or the boundary conditions, or both. The study focused on resonance conditions that produce large and possibly damaging motions. Special attention was given to modal coupling and exchanges of energy. We classified the important resonances and their interactions and devised experiments illustrating the phenomena. Keywords: Dynamic response; Nonlinear effects; Flexible structures; Composites; Modal coupling; Resonances. (jhd)

DESCRIPTORS: (U) *DYNAMIC RESPONSE, *FLEXIBLE STRUCTURES, BOUNDARIES, COUPLING(INTERACTION), DAMAGE, EQUATIONS, MOTION, NONLINEAR SYSTEMS, RESONANCE, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1, Modal coupling.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A222 704 20/4

STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Particle Simulation of Hypersonic Flow.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-31 Mar 90,

APR 90 75P

PERSONAL AUTHORS: Baganoff, Donald

CONTRACT NO. AFOSR-88-0139

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-90-0555

UNCLASSIFIED REPORT

ABSTRACT: (U) A limitation of the DSMC method is that it does not allow efficient use of vector architectures that are predominate in current supercomputers. A new selection rule for collisions between simulated molecules is developed which is highly compatible with vectorization. The collision-selection rule is shown to give identical results to the DSMC method in predicting shock-wave structure and in predicting the correct mean-free path variation with density and temperature for power-law interactions ranging from hard sphere to Maxwell molecule. Algorithmic improvements beyond those related to vectorization issues alone are also introduced, making possible simulations of single-species, rarefied, 3D hypersonic flows employing 10 million particles and 0.5 million cells. The performance of the algorithm on the Cray-2 ranges from 1 to 2 microseconds/particle/time-step. Roughly 500 to 1000 time-steps are needed to time average the results of a simulation, leading to run times of 2 to 5 hours on the Cray-2 for large problems. Keywords: Particle method; Rarefied flow; Direct simulation; Monte Carlo; Collision selection. (jhd)

DESCRIPTORS: (U) *HYPERSONIC FLOW, *MONTE CARLO METHOD, ALGORITHMS, COLLISIONS, EFFICIENCY, HARDNESS, MOLECULES, PARTICLES, RAREFACTION, SELECTION, SHOCK WAVES, COMPUTERIZED SIMULATION, SPHERES, SUPERCOMPUTERS, VECTOR ANALYSIS.

AD-A222 704 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2307AL, DSMC(Direct Simulation Monte Carlo), CRAY 2 Computers.

AD-A222 702 11/4

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF ENGINEERING SCIEN CE AND MECHANICS

(U) Role of Interfaces and Interphases in the Evolution Mechanics of Material Systems.

DESCRIPTIVE NOTE: Annual rept. 1 Dec 88-1 Dec 89,

DEC 89 34P

PERSONAL AUTHORS: Reifsnider, K.L.; Stinchcomb, W. W.; Dillard, D.; Swain, R. E.; Lesko, J.

CONTRACT NO. AFOSR-89-0216

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-90-0563

UNCLASSIFIED REPORT

ABSTRACT: (U) The general objective of this investigation is to apply the discipline of mechanics to the prediction and description of the long-term behavior of composite materials by developing experimental information, conceptual understanding, and analytical representations of the evolution of the properties of constituent materials and interfaces in composite material systems as a function of (generalized) time during the application of time-variable mechanical, thermal, and chemical loadings. The general approach to this objective is to develop mechanistic representations of the 'state of the material' under those conditions, and to join those descriptions with micromechanical descriptions of the 'state of stress' in 'critical elements' to support an estimate of remaining strength, and, thereby, to predict remaining life. We have named this enterprise 'evolution mechanics.' (jes)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, BEHAVIOR, EVOLUTION(GENERAL), EXPERIMENTAL DATA, INTERFACES, LONG RANGE(TIME), MATERIALS, MECHANICS, TIME, VARIATIONS.

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F.

AD-A222 636 20/10

APPLIED RESEARCH CORP LANDOVER MD

(U) Computer-Oriented, Multichannel, Direct-Current, Superconducting Quantum Interference Device.

DESCRIPTIVE NOTE: Final rept. 30 Sep 88-31 Mar 89,

MAY 89 56P

PERSONAL AUTHORS: Drukier, A. K.; Cao, N.; Carroll, K.

CONTRACT NO. F49620-88-C-0142

MONITOR: AFOSR
TR-90-0527

UNCLASSIFIED REPORT

ABSTRACT: (U) We describe the ARC effort leading towards the computer oriented multichannel DC-SQUID system. More specifically, we describe the prototype of lock-in, bipolar preamplifier and flux counter implemented by our team. The results of tests are quoted and show that our CD-SQUID electronics compare favorably with both commercially available BTI-Dynabias and Berkeley readout electronics. More specifically, our system seems to be more user friendly and easier to interface to the computer. (rh)

DESCRIPTORS: (U) *COMPUTERS, *INTERFERENCE, *SUPERCONDUCTIVITY, BIPOLAR SYSTEMS, INTERFACES, PREAMPLIFIERS, PROTOTYPES, QUANTUM THEORY, TEST AND EVALUATION.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A222 631 20/5

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) Molecular Interactions and Properties with Many-Body Methods.

DESCRIPTIVE NOTE: Final rept. 1 Nov 87-31 Oct 89,

APR 90 21P

PERSONAL AUTHORS: Bartlett, Rodney J.

CONTRACT NO. AFOSR-88-0041

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-90-0583

UNCLASSIFIED REPORT

ABSTRACT: (U) During the course of this research, CC/MBPT theories have been established as being among the most accurate available, and very efficient and generally applicable computer codes have been developed to perform CC/MBPT calculations. These methods have been employed for the first time in large scale ab initio calculations of potential energy surfaces. Two of the papers produced in this research have been identified by authorities as being among the most influential papers in the 50-year history of computational quantum chemistry, and four have been identified by Current Contents as qualifying as science citation classics. (jes)

DESCRIPTORS: (U) *QUANTUM CHEMISTRY, COMPUTATIONS, COMPUTER PROGRAMS, MOLECULE MOLECULE INTERACTIONS, N BODY PROBLEM, POTENTIAL ENERGY, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4.

AD-A222 629 9/3

ROCHESTER UNIV NY DEPT OF PHYSICS AND ASTRONOMY

(U) DURIP - Instrumentation for Laser Switched Power LINAC.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-30 Nov 89,

MAR 90 13P

PERSONAL AUTHORS: Melissinos, A. C.; Donaldson, W.

CONTRACT NO. AFOSR-89-0131

MONITOR: AFOSR
TR-90-0582

UNCLASSIFIED REPORT

ABSTRACT: (U) A 6cm radius, single stage, electron accelerator that uses a photoconductive switch to couple an electromagneticpulse into a radial transmission line is being developed. The switch consists of a ring GaAs which is closed with a ring of a laser light from a Phosphate glass regenerative amplifier. We are investigating the acceleration picosecond electron bunches in fields on the order of several MeV/m. (rh)

DESCRIPTORS: (U) *LASER BEAMS, *LINEAR ACCELERATORS, *SWITCHING, ACCELERATION, AMPLIFIERS, ELECTRON ACCELERATORS, ELECTRONS, GALLIUM ARSENIDES, LASERS, LINES(GEOMETRY), PHOSPHATE GLASS, POWER, RADIAL FLOW, REGENERATION(ELECTRONICS), RINGS, TRANSMISSION LINES.

IDENTIFIERS: (U) PE61104D, WUAFOSR3842A6.

AD-A222 612 4/1

RMA AEROSPACE INC MOUNTAIN VIEW CA

(U) Development of a Comprehensive Magnetohydrodynamic Model of Solar-Terrestrial Interaction.

DESCRIPTIVE NOTE: Final rept. 1 Mar 86-30 Sep 88,

DEC 88 110P

PERSONAL AUTHORS: Stahara, Stephen S.

REPORT NO. RMA-TR-0103

CONTRACT NO. F49620-86-C-0035

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-90-0534

UNCLASSIFIED REPORT

ABSTRACT: (U) The work relates to the preliminary development of a comprehensive, multi-level, 3-D magnetohydrodynamic model that seeks to describe the detailed, global interaction of the solar wind plasma and magnetic field with the Earth's geospace. The development of five separate advanced computational submodels of the complete interaction model involves approximately 42,000 lines of fortran source code. These submodels provide the capability for quantitatively simulating a variety of steady and unsteady phenomena associated with the solar wind-terrestrial environment interaction process to a degree previously unattainable. A number of these new developments have been incorporated into a core interaction submodel that can be structured to work in both a rapid warning mode for spacecraft protection as well as in a detailed scientific analysis mode for fundamental studies. The other submodels developed either simulate similar phenomena of the solar wind-terrestrial environment interaction process as the core interaction submodel but at a higher level of simulation accuracy or simulate additional interaction phenomena. (jhd)

DESCRIPTORS: (U) *MAGNETOHYDRODYNAMICS, *PLASMAS(PHYSICS), *SOLAR WIND, ACCURACY, EARTH(PLANET), FORTRAN,

AD-A222 612 CONTINUED

INTERACTIONS, MAGNETIC FIELDS, MATHEMATICAL MODELS, PROTECTION, SIMULATION, SPACECRAFT, WARNING SYSTEMS, GEOMAGNETISM.

IDENTIFIERS: (U) WUAFOSR2311A1, PE61153F.

AD-A222 578 20/2

CALIFORNIA UNIV IRVINE DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) DoD-University Research Instrumentation Program, FY 1986/FY 1987.

DESCRIPTIVE NOTE: Final rept. 15 Jul 86-30 Dec 89,

APR 90 7P

PERSONAL AUTHORS: Tsai, Chen S.

CONTRACT NO. AFOSR-86-0210

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-90-0565

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this DOD/AFOSR - University Research Instrumentation Program was to purchase and install a scanning electron microscope (SEM) system that is essential for examination and characterization of the detailed dimensions and structures of the integrated optic devices and modules that have been fabricated and explored. The SEM system acquired consists of the following major components: Model SR-50/A basic SEM system by Applied Beam, E-beam blanker unit, Model 5000-2 energy dispersive X-ray (EDX) system, Laserwriter, Closed loop water cooling system for the diffusion pump of the SEM basic system. Keywords: Scanning electron microscope (SEM) system, Integrated optic devices/modules, Microfabrication, Microstructures.

DESCRIPTORS: (U) *CRYSTALLOGRAPHY, BLANKING(ELECTRONICS), DIFFUSION, ELECTRON BEAMS, ELECTRON MICROSCOPES, ELECTRONIC SCANNERS, FABRICATION, INTEGRATED SYSTEMS, MICROMINIATURIZATION, MICROSTRUCTURE, OPTICAL EQUIPMENT, PUMPS, UNIVERSITIES.

IDENTIFIERS: (U) WUAFOSR2917A3, PE61102F.

AD-A222 576 12/3

ALBERTA UNIV EDMONTON DEPT OF STATISTICS AND APPLIED PROBABILITY

(U) Martingale Representation and the Malliavin Calculus,

89 10P

PERSONAL AUTHORS: Elliott, Robert J.; Kohlmann, Michael

CONTRACT NO. AFOSR-86-0332

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-90-0597

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Mathematics and Optimization, v20 p105-112 1989.

ABSTRACT: (U) Using stochastic flows and the Ito differentiation rule, the integrand in the representation of a martingale as a stochastic integral is identified. By iterating this representation result a homogeneous chaos type expansion is obtained. Using the stochastic integral representation, an integration by parts formula is obtained without using any calculus of variations in function space. If the inverse of the Malliavin matrix belongs to all spaces L sub p (omega) it follows that a random variable has a smooth density. Keywords: Reprints. (kr)

DESCRIPTORS: (U) *INTEGRALS, *STOCHASTIC PROCESSES, CALCULUS, CALCULUS OF VARIATIONS, DENSITY, EXPANSION, FLOW, FORMULATIONS, INTEGRATION, PARTS, REPRINTS.

IDENTIFIERS: (U) *Martingales.

AD-A222 571 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On a Basis for 'Peaks Over Threshold' Modeling.

DESCRIPTIVE NOTE: Technical rept.,

MAR 90 15P

PERSONAL AUTHORS: Leadbetter, M. R.

REPORT NO. TR-285

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0651

UNCLASSIFIED REPORT

ABSTRACT: (U) Peaks over Threshold models commonly used e.g. in hydrology, assume that peak values of an iid or stationary sequence X sub i above a high value u, occur at Poisson points, and the excess values of the peak above u are independent with an arbitrary common d.f. G. Motivation for these models has been provided by Smith by using Pareto-type approximations of Pickands for distributions of such excess values. These works strongly suggest that the Pareto family provides the appropriate class of distributions G for the POT model. This paper considers the point process of excess values of peaks above a high level u and demonstrate that this converges in distribution to a Compound Poisson Process as u approaches limit of infinity under appropriate assumptions. It is shown that the multiplicity distribution of this limit (i.e. the limiting distribution of excess values of peaks) must belong to the Pareto family and detailed forms are given for the normalizing constants involved. This exhibits the POT model specifically as a limit for the point process of excesses of peaks and delineates the distributions involved. (kr)

DESCRIPTORS: (U) *STATISTICAL DISTRIBUTIONS, *PEAK

AD-A222 571 CONTINUED

VALUES, HYDROLOGY, LIMITATIONS, MODELS, MOTIVATION, POISSON EQUATION, THRESHOLD EFFECTS, VALUE.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A222 568 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Dichotomies for Certain Product Measures and Stable Processes.

DESCRIPTIVE NOTE: Technical rept.,

MAR 90 33P

PERSONAL AUTHORS: DE F Marques, Mauro S.; Cambanis, Stamatis

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0648

UNCLASSIFIED REPORT

ABSTRACT: (U) Necessary and sufficient conditions for equivalence or singularity of certain product measures are given and applied to the problem of distinguishing a sequence of random vectors from affine transformations of itself. In particular sequences of independent stable random variables are considered and the singularity of sequences with different indexes of stability is proved. Using these results the dichotomy, two processes are either equivalent or singular, is established for certain classes of stable processes, such as independently scattered measures and harmonizable processes. Also sufficient conditions for singularity and necessary conditions for absolute continuity are given for p sub th order processes. (kr)

DESCRIPTORS: (U) *SEQUENCES(MATHEMATICS), *STOCHASTIC PROCESSES, CONTINUITY, INDEXES, RANDOM VARIABLES, SCATTERING.

IDENTIFIERS: (U) *Dichotomies.

AD-A222 558 9/3

SCHWARTZ ELECTRO-OPTICS INC CONCORD MA

(U) Development of a Modelocked Ti:Al203 Laser.

DESCRIPTIVE NOTE: Final rept. 1 Aug 89-31 Jan 89,

APR 90 23P

PERSONAL AUTHORS: Welford, David

CONTRACT NO. F49620-89-C-0089

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-90-0529

UNCLASSIFIED REPORT

ABSTRACT: (U) A variety of techniques for mode locking a titanium-sapphire laser were studied and analyzed. (jhd)

DESCRIPTORS: (U) *MODE LOCKED LASERS, *SOLID STATE LASERS, SAPPHIRE, DOPING, TITANIUM.

IDENTIFIERS: (U) PE65502F, WUAFOSR3005A1.

AD-A222 556 20/13

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Comparison of Single Point Ab initio Energies Calculated Using 3-21G and AM1 Geometries,

89 5P

PERSONAL AUTHORS: Dewar, Michael J.; Holder, Andrew J.; Healy, Eamonn F.; Olivella, Santiago

CONTRACT NO. AFOSR-89-0179

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-90-0612

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society of Chemical Communications, Issue 19, p1452-1454 1989.

ABSTRACT: (U) Single pint ab initio calculations for number of molecules, using various procedures with 3-21G or AM1 geometries, show that the AM1-based results seem to be better for high level ab initio procedures and for studies of reactions, as well as requiring less computing time. Current ab initio methods usually give good estimates of heats of reaction if a large basis set is used and if allowance is made for electron correlation, e. g. by Moeller-Plesset (MP) perturbation theory. However, calculations of this kind require too much computing time to be carried out rigorously, i.e. with full geometry optimization, for any but small molecules. It has therefore become a standard practice in such cases to calculate the geometries by a simple and correspondingly cheap method, usually the 3-21G model, and then to carry out single point calculations by the high level procedure. The same procedure is also commonly used in studies of the Transition States (TS) of reactions where the cost of calculations by a correlated high level procedure is even more forbidding. Reprints. (JES)

DESCRIPTORS: (U) *MOLECULES, *TRANSITIONS, COMPARISON, COMPUTATIONS, CORRELATION, COSTS, ELECTRONS, GEOMETRY, OPTIMIZATION, PERTURBATION THEORY, REPRINTS.

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IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A222 554 4/1

BOSTON UNIV MA

(U) Thermosphere-Ionosphere Coupling: An Experiment in Interactive Modeling,

JAN 90 8P

PERSONAL AUTHORS: Forbes, Jeffrey M.; Roble, Raymond G.

CONTRACT NO. F49620-88-C-0111

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-90-0542

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v95 nA1 p201-208, 1 Jan 90.

ABSTRACT: (U) The NCAR thermosphere general circulation model (TGCM) is used to perform a series of controlled experiments aimed at better understanding the interactive coupling between ionospheric plasma densities and thermospheric neutral winds. The experiments are simple and controlled to facilitate identification of governing mechanisms. The interaction is accomplished by parameterizing the F layer peak height (hmF2) in an empirical ionospheric model in terms of the meridional wind (Vsouth) and forcing hmF2 and Vsouth to remain mutually coupled in a dynamic calculation. Interactive computations are performed where the TGCM is driven by 30-kV and 90-kV cross polar cap potentials and are compared with corresponding reference simulations where hmF2 is constrained to a balance height near 280 km with a small (about 20 km) diurnal variation. Mutual coupling between hmF2 and Vsouth is found to be weak during the daytime when the F layer exhibits a broad vertical structure. At night, when the F2 layer is more localized, the neutral dynamic structure is dependent on whether hmF2 is significantly above or below the altitude (approximately 275-300 km) at which ion drag effectively competes with viscosity in the neutral momentum balance. At Arecibo during both levels of high-latitude forcing the premidnight elevation (+75 km) of hmF2 relative to a

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AD-A222 554 CONTINUED

nighttime height of approximately 290 km is accompanied by an increase (about 50 m/s) in the zonal wind above 250 km relative to the noninteractive simulation. A much smaller effect, characterized by an 8-hour periodicity spanning 24 hours, is seen in the meridional windcomponent. Ionospheric models; Thermosphere coupling interaction. Reprints. (edc)

DESCRIPTORS: (U) *IONOSPHERIC MODELS, BALANCE, CIRCULATION, COMPUTATIONS, COUPLING(INTERACTION), DENSITY, DIURNAL VARIATIONS, DRAG, DYNAMICS, ELEVATION, F REGION, HEIGHT, HIGH LATITUDES, IONOSPHERE, IONS, MODELS, MOMENTUM, NEUTRAL, NIGHT, PEAK VALUES, PERIODIC VARIATIONS, PLASMAS(PHYSICS), REPRINTS, SIMULATION, THERMOSPHERE, VERTICAL ORIENTATION, VISCOSITY, WIND.

IDENTIFIERS: (U) Atmospheric circulation, PE61102F, WUAFOSR2310A2.

AD-A222 553 7/2

CLARKSON UNIV POTSDAM NY DEPT OF CHEMISTRY

(U) Preparation and Properties of Uniform Mixed and Coated Colloidal Particles. Part 5. Zirconium Compounds,

90 12P

PERSONAL AUTHORS: Alken, Bar; Hsu, Wan P.; Matijevic, Egon

CONTRACT NO. F49620-85-C-0142

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-90-0546

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Materials Science, v25 p1886-1894 1990. See also Part 6, AD-A216 164.

ABSTRACT: (U) Colloidal dispersions of uniform spherical particles by zirconium basic sulphate and zirconium oxy-basic carbonate were prepared by ageing zirconium sulphate solutions at elevated temperatures in the presence of urea. Different chemical compositions of the above products resulted when the ageing temperature was altered. Depending on the nature of the original solids, calcination at 800 C resulted in the formation of tetragonal or monoclinic zirconia. Under certain conditions a mixed phase, including cubic zirconia, has also been identified. The particle morphology was retained during these transformations. Coprecipitation in mixed solutions of zirconium and yttrium salts aged at 80 C yielded composite spherical particles of basic carbonate with a zirconium to yttrium ratio of the solid similar to that used in the initial solution. Reprints. (JES)

DESCRIPTORS: (U) *CARBONATES, *ZIRCONIUM COMPOUNDS, CHEMICAL COMPOSITION, CHEMICAL PRECIPITATION, COLLOIDS, DISPERSIONS, HIGH TEMPERATURE, MIXING, MORPHOLOGY, PARTICLES, RATIOS, SALTS, SOLIDS, SOLUTIONS(GENERAL), SPHERES, SULFATES, UREA, YTTRIUM, ZIRCONIUM, ZIRCONIUM OXIDES.

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IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A222 549 11/9

PENNSYLVANIA STATE UNIV UNIVERSITY PARK COMPOSITES MANUFACTURING TECHNOLOGY C ENTER

(U) Prediction and Control of Processing-Induced Residual Stresses in Composites. Part 1. IM6/BMI Composite.

DESCRIPTIVE NOTE: Final technical rept. Jun 87-Jun 89,

SEP 89 84P

PERSONAL AUTHORS: White, Scott R.; Hahn, Hong T.

REPORT NO. CMTC-8945

CONTRACT NO. AFOSR-87-0242

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-90-0569

UNCLASSIFIED REPORT

ABSTRACT: (U) Residual stresses are developed during processing of composites due to the thermal mismatch between constituents and the chemical shrinkage of the matrix during the crosslinking reaction. Our research has shown that these residual stresses can be high enough to cause ply cracking even before loading. The objectives of the present research were to determine how residual stresses develop during processing, develop a model which would predict these residual stresses, and find an optimization scheme which would reduce the residual stresses induced by processing. The approach taken was to monitor the residual stress development through the curvature measurements in unsymmetric cross-ply specimens. The material system used was a graphite/BMI manufactured by American Cyanamid under the trade name CYCOM 3100(TM). Both elastic and viscoelastic models were used to predict the induced curvature. Mechanical testing and thermal analysis of processed specimens provided the input data for modeling. Drawing from the experimental results and analytical modeling, several cure cycle variations were proposed and investigated to reduce residual stresses. Keywords: Plastics, Thermoplastic matrix composite, Peek, Mechanical properties, Crystals, Polymers.

AD-A222 549 CONTINUED

DESCRIPTORS: (U) *THERMOPLASTIC RESINS, CHEMICAL REACTIONS, CHEMICALS, COMPOSITE MATERIALS, CROSSLINKING(CHEMISTRY), CRYSTALS, CURVATURE, ELASTIC PROPERTIES, GRAPHITE, INPUT, MATHEMATICAL MODELS, MATRIX MATERIALS, MEASUREMENT, MECHANICAL PROPERTIES, MODELS, OPTIMIZATION, POLYMERS, PROCESSING, RESIDUAL STRESS, SHRINKAGE, TEST AND EVALUATION, THERMAL ANALYSIS, VISCOELASTICITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A222 540 7/6

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF CHEMISTRY

(U) Organosiloxyphosphazene Polymers: Synthesis via Aminosiloxane Reagents,

90 11P

PERSONAL AUTHORS: Allcock, Harry R.; Coggio, William D.

CONTRACT NO. AFOSR-89-0234

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR 90-0568

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Macromolecules, v23 n6 p1626-1635 1990.

ABSTRACT: (U) The synthesis of new polymers with a phosphazene backbone and organosilicon side groups offers the prospect of access to new materials with unusual characteristics. Such polymers may combine the advantages of polysiloxanes with those of polyphosphazenes. Their behavior as membranes, elastomers, and biomaterials is of considerable interest. Keywords: Macromolecules, Reprints, Composite materials. (JG)

DESCRIPTORS: (U) *ORGANIC COMPOUNDS, *PHOSPHAZENE, *SIDES, *SILICON COMPOUNDS, ACCESS, COMPOSITE MATERIALS, ELASTOMERS, MACROMOLECULES, POLYMERS, REPRINTS, SILOXANES, SYNTHESIS.

IDENTIFIERS: (U) Organosiloxyphosphazene, Aminosiloxane Reagents.

AD-A222 540

AD-A222 500 7/4

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) AM1 Studies of E2 Reactions. 1. Mechanism and Leaving Group Effects,

90 9P

PERSONAL AUTHORS: Dewar, Michael J.; Yuan, Yate-Ching

CONTRACT NO. AFOSR-89-0179

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-90-0613

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical Society, v112 n6 p2088-2094 1990.

ABSTRACT: (U) The mechanisms of bimolecular gas-phase elimination reactions have been studies, by use the AM1 models. Calculations are carried out for E2 reactions between a base (B) and a molecule H-CHR-CHS-X, where B is methoxide anion and X is a neutral leaving group, and where B is a neutral base and X is an onium ion. The results are compared with experiment and earlier calculations and interpretations. Keywords: Chemical reactions, Reprints. (jes)

DESCRIPTORS: (U) *CHEMICAL REACTIONS, ELIMINATION REACTIONS, MOLECULES, NEUTRAL, PHASE, REACTION KINETICS, REACTIVE GASES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A222 472 15/3.1

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF ENGINEERING SCIEN CE AND MECHANICS

(U) Nonlinear Dynamics and Control of SDI Structural Components.

DESCRIPTIVE NOTE: Final rept. Sep 87-Feb 90,

MAY 90 16P

PERSONAL AUTHORS: Nayfeh, A. H.; Burns, J. A.; Cliff, E. M.

CONTRACT NO. F49620-87-C-0088

PROJECT NO. D812

TASK NO. K1

MONITOR: AFOSR TR-90-0647

UNCLASSIFIED REPORT

ABSTRACT: (U) The report summarizes results of experimental and theoretical investigations into the nonlinear response and control of structural elements. Methods for the analysis and design of control procedures applicable to certain nonlinear distributed parameter systems were investigated. Analytical and computational techniques were developed for evaluating the nonlinear effects on control designs. Bench-type experiments were conducted for validating some of the theoretical results. Keywords: Nonlinear dynamics; Control; Resonances; Modal coupling. (jhd)

DESCRIPTORS: (U) *CONTROL SYSTEMS, *STRATEGIC DEFENSE INITIATIVE, BENCH TESTS, COMPUTATIONS, COUPLING(INTERACTION), DISTRIBUTION, DYNAMICS, NONLINEAR SYSTEMS, PARAMETERS, RESPONSE, THEORY.

IDENTIFIERS: (U) PE63221C, WUAFOSRD812K1.

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MCDONNELL DOUGLAS SPACE SYSTEMS CO HUNTINGTON BEACH CA

(U) The Near-Earth Orbital Environment Coupling to Its Energy Sources.

DESCRIPTIVE NOTE: Final rept. 1 Mar 87-28 Feb 90,

MAY 90 79P

PERSONAL AUTHORS: Olsen, William

CONTRACT NO. F49620-87-C-0039

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR TR-90-0658

UNCLASSIFIED REPORT

ABSTRACT: (U) Under the present study the qualitative work performed earlier has been extended to perform quantitative calculations of the entry of plasma into the magnetosphere. These calculations include the structure of the low-latitude boundary layer and the energy spectrum of the particles within the plasma sheet. These calculations were performed using actual satellite data and virtually no assumed parameters. The success of these calculations provides impressive evidence for the validity of the Gradient Drift Entry theory. It also proves that the widely held notion that the magnetosheath cannot be the source of plasma sheet particles is in error. The success of this study permits the development of quantitative models of the magnetosphere required for the prediction of magnetospheric and upper atmospheric and ionospheric effects on those hardware systems which must operate in Earth orbital space. (KR)

DESCRIPTORS: (U) *MAGNETOSPHERE, *ATMOSPHERE ENTRY, *PLASMAS(PHYSICS), COMPUTATIONS, COUPLING(INTERACTION), EARTH ORBITS, EARTH(PLANET), ENERGY, IONOSPHERE, MODELS, ORBITS, PARTICLES, PLASMA SHEATHS, SHEETS, SOURCES, SPACE ENVIRONMENTS, SPECTRA, TELEMETERING DATA.

IDENTIFIERS: (U) WUAFOSR2311A1, PE61102F, Gradient drift.

AD-A222 409 12/3

ALBERTA UNIV EDMONTON DEPT OF STATISTICS AND APPLIED PROBABILITY

(U) Robust Approximations for the Filtering Problem,

82 5P

PERSONAL AUTHORS: Elliott, Robert J.

CONTRACT NO. AFOSR-86-0332

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-90-0589

UNCLASSIFIED REPORT

ABSTRACT: (U) A diffusion observation process is approximated by a Markov chain. The information obtained by observing the Markov chain is the same as that obtained by observing a related multivariate point process. Filtering and Zakai equations are obtained for multivariate point process observations. These involve Stieltjes integrals rather than Ito integrals with respect to Brownian motion, and so they provide robust formulae, that is, formulae which are continuous in the observation process. (kr)

DESCRIPTORS: (U) *MATHEMATICAL FILTERS, BROWNIAN MOTION, DIFFUSION, EQUATIONS, INTEGRALS, MARKOV PROCESSES, MULTIVARIATE ANALYSIS, OBSERVATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A222 383 12/3

ALBERTA UNIV EDMONTON DEPT OF STATISTICS AND APPLIED PROBABILITY

(U) The Variational Principle for Optimal Control of Diffusions with Partial Information,

89 8P

PERSONAL AUTHORS: Elliott, Robert J.; Kohlmann, Michael

CONTRACT NO. AFOSR-86-0332

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-90-0588

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Systems and Control Letters, v12 p63-69 1989.

ABSTRACT: (U) Strong variations are described for the epsilon-optimal control of a class of control problems for systems described by stochastic diffusion equations. The differentiation process developed identifies the adjoint process. Reprints. (jhd)

DESCRIPTORS: (U) *DIFFUSION, *STOCHASTIC PROCESSES, *VARIATIONAL PRINCIPLES, CONTROL, REPRINTS.

IDENTIFIERS: (U) Adjoint processes, WUAFOSR2304A1, PE61102F.

AD-A222 380 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Trapezoidal Monte Carlo Integration,

FEB 90 23P

PERSONAL AUTHORS: Masry, Elias; Cambanis, Stamatis

REPORT NO. TR-243

CONTRACT NO. F49620-85-C-0144, N000140-84-K-0042

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0655

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. Numer. Anal., v27 n1 p225-246, Feb 90. Prepared in cooperation with the Department of Electrical and Computer Engineering, University of California at San Diego, La Jolla, California 92093-0407.

ABSTRACT: (U) The approximation of weighted integrals of random processes by the trapezoidal rule based on an ordered random sample is considered. For processes that are once mean-square continuously differentiable and for weight functions that are twice continuously differentiable, it is shown that the rate of convergence of the mean-square integral approximation error is precisely n to the minus 4th power, and the asymptotic constant is also determined. Keywords: Reprints. (kr)

DESCRIPTORS: (U) *NUMERICAL INTEGRATION, *MONTE CARLO METHOD, INTEGRALS, REPRINTS, WEIGHTING FUNCTIONS, STATISTICAL SAMPLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, Trapezoidal rule.

AD-A222 379 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Freidlin-Wentzell Type Estimates for a Class of Self-Similar Processes Represented by Multiple Wiener Integrals,

89 12P

PERSONAL AUTHORS: Oodaira, Hiroshi

REPORT NO. TR-170

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0656

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Yokohama Mathematical Jnl., v37 p145-155 1989.

ABSTRACT: (U) A large deviations result is obtained for a class of se lf-similar processes represented by multiple Wiener integrals, which includes the limit processes appearing in functional non-central limit theorems. Keywords: Reprints; Brownian motion; Hilbert space. (kr)

DESCRIPTORS: (U) *STATISTICAL PROCESSES, *ESTIMATES, *INTEGRALS, BROWNIAN MOTION, HILBERT SPACE, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A222 344 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Multi-Hilbertian Spaces and their Duals,

MAR 90 54P

PERSONAL AUTHORS: Merkle, Milan J.

REPORT NO. TR-291

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0646

UNCLASSIFIED REPORT

ABSTRACT: (U) In the last several years there has been a remarkable amount of work in probability on infinitely dimensional spaces, in particular on nuclear spaces. Although the most of work has been done in nuclear spaces, some of the basic theorems (for instance, Ito's regularization theorem), are given in a much more general context of multi-Hilbertian spaces. In this paper we study topological properties of multi-Hilbertian spaces and their duals, hoping that this will serve as an introduction to a study of probability problems on these spaces. We tried to clearly distinguish properties that are consequences of nuclearity from those that hold on non-nuclear spaces. In section 5, we propose a non-standard completion theorem, removing the condition of compatibility of norms, a condition that seems to be overlooked in most probability papers in this area. Also, we give a detailed account on open, bounded and compact sets. Elaborated proofs are left for appendices, and, as a result, appendices occupy a considerable space. This is mostly due to results related to seminorms that we wanted to make rigorous. The results that are given in this paper are selected with a purpose to serve as a basis for probability investigation; the topology alone was not the aim. As a continuation of this work, we plan to investigate sigma- algebras and probability measures, and weak convergence of measures in a general context of

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multi-Hilbertian spaces. Also, we plan to investigate examples of interest in applications. (kr)

DESCRIPTORS: (U) *HILBERT SPACE, ALGEBRA, MEASURE THEORY, PROBABILITY, SIZES(DIMENSIONS), THEOREMS, TOPOLOGY, WEAK CONVERGENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A222 340 20/7 9/3

WAYNE STATE UNIV DETROIT MI

(U) Diagnostics for Hydrogen Atoms and Molecules in H-Atom Sources and Beams Using VUV Laser Light.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 86-31 Dec 89,

APR 90 27P

PERSONAL AUTHORS: Rothe, Erhard

CONTRACT NO. F49620-86-C-0079

PROJECT NO. D812

TASK NO. F1

MONITOR: AFOSR
TR-90-0528

UNCLASSIFIED REPORT

ABSTRACT: (U) An H(-) ion source for high brightness H atoms beams should have the lowest possible internal temperature T, because the beam-power density at a distance scales as 1/T. We determine local Temperature inside a discharge with the use of a tunable ArF excimer laser that measures the populations of the lowest four rotational states of H2 by means of (2+1) resonance enhanced multiphoton ionization (REMPI). The number of laser-created ions causes a proportional change of the discharge's electrical impedance. A calibration in room temperature H2 (without a discharge) showed that the REMPI works well. Another objective is to monitor vibrationally excited molecules, H2(v), that are believed to be the primary origin of H(-) within volume-type ion sources. We use the same apparatus and approach, but add a Raman shifter to change the laser wavelengths to those appropriate for (2+1) REMPI of H2(V). Keywords: Neutral beam, Ion source diagnostics, Laser diagnostics, REMPI, Particle accelerator components, Physics. (JG)

DESCRIPTORS: (U) *ATOMS, *HYDROGEN, *LASER BEAMS, *MOLECULES, *NEUTRAL, *VACUUM ULTRAVIOLET RADIATION, CALIBRATION, DIAGNOSIS(GENERAL), ELECTRIC DISCHARGES, ELECTRICAL IMPEDANCE, EXCIMERS, FREQUENCY, INTERNAL, ION SOURCES, LASER APPLICATIONS, LASERS, PARTICLE ACCELERATOR

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COMPONENTS, PHOTOIONIZATION, PHYSICS, POPULATION, RAMAN SPECTRA, RANGE(DISTANCE), SCALE, SHIFTING, TEMPERATURE.

IDENTIFIERS: (U) REMPI.

AD-A222 337 20/11

SCIENTIFIC SYSTEMS INC WOBURN MA

(U) Adaptive Time Series Analysis Using Predictive Inference and Entropy.

DESCRIPTIVE NOTE: Final rept. Dec 86-Oct 89.

FEB 90 141P

PERSONAL AUTHORS: Mehra, Raman K.; Mahmood, Shah

CONTRACT NO. F49620-87-C-0026

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-90-0289

UNCLASSIFIED REPORT

ABSTRACT: (U) Research is reported on adaptive time series methods for detecting and tracking both abrupt and slow changes in both structure and parameters of dynamic systems. The methods are based on a unified statistical framework which is motivated by statistical inferences and entropy arguments. The method yields estimates of multivariate input/output dynamics and noise statistics. It also gives estimate of system order that is optimal in the sense of an information theoretic criterion. The integrated approach is known as CVA-AIC. Many theoretical issues have been explored under the scope of this project. The relationship between this technique and another powerful framework for estimation known as E-M algorithmic approach has been established. It the CVA-AIC technique is embedded properly in an E-M framework, it leads to maximum likelihood estimates and recursive algorithms for system identification. (jhd)

DESCRIPTORS: (U) *DYNAMICS, *STATISTICAL INFERENCE, *TIME SERIES ANALYSIS, ADAPTATION, ADAPTIVE SYSTEMS, ALGORITHMS, ELECTROMAGNETIC RADIATION, ENTROPY, ESTIMATES, IDENTIFICATION, INPUT OUTPUT PROCESSING, MAXIMUM LIKELIHOOD ESTIMATION, MULTIVARIATE ANALYSIS, NOISE, RECURSIVE FUNCTIONS, TRACKING, YIELD.

IDENTIFIERS: (U) LSS(Large Space Structures), PE65502F,

AD-A222 337 CONTINUED

WUAFOSR3005A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A222 336 9/5

GELTECH INC ALACHUA FL

(U) A Collaborative US/UK Research Program in Advanced Silica Macromolecular Micro-Optics.

DESCRIPTIVE NOTE: Final technical rept. 15 Oct 87-14 Feb 90,

APR 90 231P

PERSONAL AUTHORS: Nogues, Jean-Luc R.

CONTRACT NO. F49620-88-C-0010

PROJECT NO. 1693

TASK NO. 06

MONITOR: AFOSR
TR-90-0523

UNCLASSIFIED REPORT

ABSTRACT: (U) The major challenge facing sol-gel processing of advanced optical materials, and in fact the entire field of chemically derived ceramics, is to relate processing variables to final properties. Fundamental studies of sol-gel processing science pursued at GELTECH during the last few years have led to two major accomplishments: (1) Development of a generic sol-gel process for producing fully dense silica monoliths (Type V Silica) (2) Development of a generic sol-gel process for producing porous silica monoliths (Type VI Silica). These two materials present many unique properties and offer enormous potential for the development of new optical components and advanced optic systems with unique capabilities. In order to take full advantage of the unique capabilities of the GELSIL process, considerable efforts have been devoted to develop international collaboration in the field of advanced optical systems. This effort lead to the establishment of several research programs in some of the world leader laboratories in the field of advanced optics. These research programs and a summary of results to date are given below. Keywords: Optics, Silica, Porous silica, Mixing, Casting, Aging, Drying, Stabilization, Densification, Organic/inorganic composite, Liquid crystals, Laser, Arrays, Titania. (jes)

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DESCRIPTORS: (U) *OPTICAL EQUIPMENT, COMPOSITE MATERIALS, DENSITY, DRYING, GLOBAL, INORGANIC MATERIALS, LABORATORIES, LASERS, LEADERSHIP, LIQUID CRYSTALS, OPTICAL MATERIALS, OPTICS, ORGANIC MATERIALS, POROUS MATERIALS, PROCESSING, RESEARCH MANAGEMENT, SILICON DIOXIDE, VARIABLES.

IDENTIFIERS: (U) PE63224C, WUAFOSR169306.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI26B

AD-A222 328 12/1

GEORGIA INST OF TECH ATLANTA SCHOOL OF ELECTRICAL ENGINEERING

(U) Singular Perturbation Theory for Piecewise-Linear Systems with Random Inputs.

89 18P

PERSONAL AUTHORS: Heck, B. S.; Haddad, A. H.

CONTRACT NO. AFOSR-87-0308

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-90-0585

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Stochastic Analysis and Applications, v7 n3 p273-289 1989.

ABSTRACT: (U) The effect of random inputs on a continuous piecewise-linear singularly perturbed system is investigated in this reprint. Reduced-order models are developed for a second-order system (one fast and one slow variable) which has a random input. It is shown that the solutions of the reduced-order models approximate the actual solution with differences in probability density functions of order O(micron to the one half power) (in a distributional sense). For the special case of a system which is linear in the fast variable, it is shown that the mean-squared error between the approximate and actual solutions in the fast time scale is of order O(micron). An outline is provided for the extension of the results to the vector variable case. Reprints. (kr)

DESCRIPTORS: (U) *LINEAR SYSTEMS, *PERTURBATION THEORY, INPUT, MODELS, PERTURBATIONS, POWER, PROBABILITY DENSITY FUNCTIONS, QUICK REACTION, REDUCTION, REPRINTS, SCALE, VARIABLES, VECTOR ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.