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R & D Abstracts

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Vol. 20, No. 13, 1st-15th July, 1967

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DOCUMENTATION

TIL/AG/60/3 — UNCLASSIFIED
Advisory Group for Aerospace Res. & Dev. NATO — UNLIMITED
INDEX TO AGARD PUBLICATIONS 1952-1963
SUPPLEMENT NUMBER TWO 1965 — 012 AGARD
Vannucci, A.G., Dunne, J.C.
99pp.

Presents a bibliographical listing of AGARD literature published in 1965; some material issued in 1966 has also been included where this aids continuity. The general arrangements of material follows that of Supplement Number One, 1964 and AGARD Publications Index, 1952-1962, except that this current supplement contains two new series of AGARD Publications, AGARD Conference Proceedings and AGARD Advisory Reports. The subject, author, and report and document number indexes provided relate only to the material listed in this Supplement.

AD 644252 P.3485 — UNCLASSIFIED
Rand Corp., Santa Monica, Calif., U.S.A. — UNLIMITED
A SUBJECT HEADING AUTHORITY LIST,
COMPUTER PREPARED — 025.5
Way, W.
Dec., 1966 52pp.

SHAL is a computer-maintained Subject Heading Authority List used by The RAND Corporation Library. The initial analysis and subsequent methods for producing SHAL are described with emphasis on the evaluation of design alternatives. The first sections cover the problems to be solved, a design criteria, a comparative study of usable computer methods, and those factors leading to a final design choice. Subsequent sections detail the procedures used in preparing SHAL and the unique features of the new listing method. A final section explores future refinements and further applications of the techniques used.

VJB

UKSM Report 67/22 — OPEN DISTRIBUTION
United Kingdom Scientific Mission,
Washington, D.C., U.S.A. — 025.5
SCIENTIFIC AND TECHNICAL COMMUNICATION — 061.3 "3,1967"
Bourne, H.K.
April, 1967 7pp.

Summarises papers presented at 1967 IEEE Convention in New York City, 20-23 March, 1967. Perspectives on the panorama of scientific and technical information, (Wayl, F.J.); I.E.E.E. information service,(Tompkins, H.E.); On line technical information system at M.I.T. - Project TIP (Kessler, M.M.); mechanisation of libraries, (Warbeit, I.A.)

VJB

PSYCHOLOGY

AD 615159 64-20 — UNCLASSIFIED
Navy Medical Neuropsychiatric Res. — UNLIMITED
Unit, San Diego, Calif., U.S.A.
ON THE VALIDITY AND RELIABILITY OF THE — 159.9.07
AUTONOMIC LABILITY SCORE — 612.087.9
Lubin, A., Hord, D.J., et al. — Proj. MR 005-12-2304
Dec., 1964 16pp.,15ref. — GRANT NIMH MY 5504

Lacey's Autonomic Lability Score (ALS) is discussed and compared with Wilder's Law of Initial Value (LIV). It is seen that the ALS is inherently no "fairer" than the difference score, percent change score, difference between standardized scores, etc. Each scoring procedure is most appropriate and most effective in situations where the other scoring procedures would be inappropriate or less effective. Hord, Lubin, and Johnson (1964) found some variables like heart rate and respiration rate that follow the LIV, some like skin conductance that follow the inverse of the LIV, and still others like finger temperature where b_{yx} is very close to unity. To use the ALS alone for all these autonomic variables would be to distort and discard valuable information.

RHW

P 147617 UTIAS TN 106 UNCLASSIFIED
Toronto Univ., Inst. for Aerospace Studies, UNLIMITED
Canada
THE TRAINING OF SUBJECTS FOR UTIAS 355.55
RESEARCH ON DYNAMICS OF HUMAN PILOTS 159.946
Simpson, R.R. 621.514
March, 1967 45pp.,5ref. 371.677

Describes the facility and the techniques used for the initial training of subjects for current research on human pilot dynamics at UTIAS. The data on the progress of training are presented and analyzed for each subject, and criteria are introduced for evaluation of the degree of proficiency of the subject. Initial steps to refine the system for future work are also described.

RHH

TRAINING

AD 630604 SRR 66-17 FR UNCLASSIFIED
Naval Personnel Res. Activity, UNLIMITED
San Diego, Calif., U.S.A.
COURSE DESIGN MANUAL FOR JOB TRAINING 355.51
COURSES (A PRELIMINARY EDITION) 373.6 (075)
March, 1966 129pp.,10ref.

A preliminary edition of a manual designed to assist instructors in developing and improving job-related training courses. The course design process is explained in nine operational steps. Suggestions are developed for accomplishing each step. Material from actual course design is used to illustrate the steps.

RHH

OPERATIONS RESEARCH

AD 609520 SR-1 UNCLASSIFIED
Army Chemical Center, Md., U.S.A. UNLIMITED
VALUE ANALYSIS (VALUE ENGINEERING).
A TECHNIQUE FOR OBTAINING MORE VALUE 65.031
FOR THE DEFENSE DOLLAR
Huss, H.O.
Reprinted Sept., 1962
Revised March 1963
Dec., 1961 94pp.,62ref.

Contains: An introduction to value analysis; Value analysis considerations; Value analysis fundamentals; The value analysis job plan; Value analysis techniques; Contracting for value analysis.

VJB

BIOLOGY AND MEDICINE

RAE LIBY. TRANSL. 1208 UNCLASSIFIED
Royal Aircraft Est., Ministry of Aviation, UNLIMITED
U.K.
PROTOPLASMIC STREAMING(Transl. from 576.321
PROTOPLASMSTRÖMUNG:
Protoplasma,5,,600-614,1961)
Kamiya, N.
Jan., 1967 21pp.,40ref.

The problem of cytoplasmic streaming is considered in Nitella and a Myxomycete Plasmodium. The force of Cyclosis on streaming in intact Nitella cells is measured by means of a centrifuge, a figure of 1 or 2 dynes/cm² is given. Streaming persists in segments of cells tied off and is most vigorous at regions adjacent to the cortex. Chloroplasts in isolated drops of cytoplasm revolve rapidly. Cytoplasmic streaming force in Plasmodium is measured by means of a special double chamber. The organism itself is the connecting link between the two parts of the double chamber, thus pressure changes in one part of the chamber are transmitted via the organism to the other part. By this means it is possible to counterbalance the motive force of streaming within the organism and to construct "Dynoplasmograms".

(continued)

RAE LIBY. TRANSL. 1208 (continued)
A theory of Cycloplasmic streaming based on a molecular streaming force between the cortical gel and the sol is put forward for Nitella and a discussion on the role of ATP in relation to streaming is given.

CEP

P 148462 AAL TR 63-31 UNCLASSIFIED
Harvard Univ., Cambridge, Mass., U.S.A. UNLIMITED
THERMOREGULATORY FUNCTION OF THE HORNS
OF THE FAMILY BOVIDAE 591.128
Taylor, C.R. 591.478.8:
Dec., 1966 106pp.,64ref. 599.735.5
:F 41 (657) 380

Three conclusions are drawn: The anatomy and physiology of bovid horns are consistent with a thermoregulatory function; the morphology distribution, and function of horns are too complex to allow simple correlations; and a clear understanding of these relationships can only be obtained by a field study which encompasses all possible functions of the horns.

FAM

NASA TTF 468 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
METABOLIC RATE AND LONGEVITY OF DROSOPHILA.
I. INTRODUCTORY REMARKS AND REVIEW OF THE 595.772.4
LITERATURE (Transl. from: INTENSIVNOST' 576.8.095.3
OBMEN. I PRODOLZHITEL'NOST' ZHIZNI 576.8.095.49
DROSOPHILA. I. VVODNYYE ZAMECHANIYA I
OBZOR LITERATURY. Arkhiv Biologicheskikh
Nauk, 38, (3) pp. 639-650, 1935, U.S.S.R.)
Shcherbakov, A.P.
May, 1967 15pp.,22ref.

Summarizing the material regarding the duration of life and the metabolism in Drosophila melanogaster, the author concludes that all the existing material supports the theoretical concepts laid down by Rubner and developed further by E. Bauer. Rubner's constant for normal (wild) Drosophila melanogaster equals approximately 8.7 mg of CO_2 per milligram of weight.

(continued)

NASA TTF 468 (continued)
This corresponds to 2.5×10^4 calories per 1 kilogram of weight, assuming RQ=0.85. Rubner's constant may change with the change of the hereditary constitution of the fly. The mutation vestigial, the life of which is shorter and the metabolism not higher but probably even lower than normal, may serve as an example. From the fact that the constant proved the same at different temperatures (table IV) it follows that within the limits of a certain temperature range (physiologic limits), the longevity is in inverse proportion to the rate of the metabolism, other conditions being equal. The difference in longevity between males and females is related to differences of the metabolism in inverse order. Rubner's constant therefore proves to be the same in both sexes. There are reasons to believe that this is only a single instance of a general rule which holds true for many organisms.

FAM

NASA TTF 466 — UNCLASSIFIED
National Aero. & Space Admin., U.S.A. — UNLIMITED
METABOLIC RATE AND LONGEVITY OF DROSOPHILA
II. THE LONGEVITY AND METABOLIC RATE IN DROSOPHILA MELANOGASTER AT DIFFERENT POPULATION DENSITIES — 595.772.4, 576.8.095.3, 576.8.095.49
(Transl. from: INTENSIVNOST' OBMENA I PRODOLZHITEL'NOST' ZHIZNI DROSOPHILA. II. PRODOL'ZHITEL'NOST ZHIZNI I INTENSIVNOST' OBMENA U DROSOPHILA MELANOGASTER PRI RAZNOY PLOTNOSTI NASELENIYA, Arkhiv Biologicheskikh Nauk, 38, (3) pp.651-655, 1935, U.S.S.R.)
Shcherbakov, A.P.
May, 1967 6pp.,3ref.

The intensity of oxygen absorption in adult Drosophila melanogaster varies with the change in the density of population. With increase of density the intensity of respiration increases. With a density of 2 flies per vessel (3- cc volume), the absorption of O_2 per hour per gram of weight equals 4.13 cc; with a density of 200 flies respiration increases to 5.16 cc O_2. The intensity of respiration changes much less than the duration of life of the flies according to Pearl. The changes of these two factors have an entirely different character. While the longevity of the flies decreases in both directions from a certain optimal density of population (30-50 flies per vessel), respiration simply increases, though irregularly, with the increasing density.

FAM

AD 640870 TR ARL TR 66-17 — UNCLASSIFIED
Air Force Systems Command, Aerospace Medical Div., Holloman AFB., N.Mex., U.S.A. — UNLIMITED
AN EXPLORATORY STUDY OF THE EFFECTS OF A HYPERBARIC ENVIRONMENT ON THE CHIMPANZEE (28.11-11.12.1965) — 612.014.41, 612.27, 626.02
Koestler, A.G., Day, P.W.
Sept., 1966 40pp.,17ref.

Two chimpanzees were exposed to hyperbaric conditions equivalent to 50, 200, and 300 feet of seawater. Pressures were accomplished with compressed air in a dry compression chamber. Both subjects accomplished the dives without apparent physiological damage. Behavioural tasks showed small temporary decrements during extreme pressures, particularly in auditory reaction times. No symptoms of dysbarism or inert gas narcosis were evident. The use of the chimpanzee as a precursor to man in high-pressure research is recommended.

RHH

AD 457840 NADC-ML-6413 N65-18881 — UNCLASSIFIED
Naval Air Dev. Center, Johnsville, Pa., U.S.A. — UNLIMITED
HEMODYNAMIC AND CINE-RADIOGRAPHIC STUDY OF TRANSVERSE ($+G_x$) ACCELERATION — 612.014.47, 612.13
Sandler, H.
21.9.1964 49pp.,25ref.

Cardiopulmonary haemodynamics were studied in dogs during acceleration of $+5\ G_x$, $+10\ G_x$ and $+15\ G_x$ on the Johnsville centrifuge. Changes in cardiopulmonary parameters were correlated with changes in the heart and lungs recorded by cine-radiography and cineangiocardigraphy using a 9-inch image intensifier x-ray system. Decreases in cardiac output and stroke volume were recorded by dye dilution techniques in all animals and confirmed by cineangiocardiographic studies. A marked and consistent fall in arterial oxygen saturation was also recorded. The role of atelectasis as the cause for this fall in oxygen saturation was discussed.

RHH

AD 635982 TR — UNCLASSIFIED
Institute of Occupational Health, Physiology Dept., Helsinki, Finland — UNLIMITED
THE EFFECTS OF EXPOSURES TO EXTREMELY HOT ENVIRONMENTS ON THE TEMPERATURES MEASURED AT THE TYMPANIC MEMBRANE, IN THE OESOPHAGUS AND IN THE RECTUM OF MEN — 612.591, 612.855, 611.329, 611.35
Piironen, P. — Grant EOAR 62-31
28.2.1963 47pp.,6ref.

The responses of the oesophageal, tympanic, and rectal temperatures of resting nude human subjects were investigated in different thermal environments ranging from 50 deg. to 130 deg.C; changes in temperatures in the oesophagus and at the tympanic membrane appeared rapidly, were linear and of equal magnitude. They were considered to follow closely the blood temperature in the central circulation. The simultaneous changes in the rectal temperature were slow and irregular.

RHH

P 148350 AAL-TR-66-12 UNCLASSIFIED
Arctic Aeromedical Lab., Fort Wainwright, Alaska, U.S.A. UNLIMITED
DIETARY MODIFICATIONS OF COLD-INDUCED METABOLIC EFFECTS (15.1-1.4.1965) 612.592 612.39
Vaughan, D.A., Vaughan, L.N., et al.
Feb., 1967 8pp.,10ref.

Cold-exposed male Sprague-Dawley rats were forced to obtain their extra caloric requirements from either carbohydrate (sucrose) or fat (Crisco). Rats were killed, one, four and eight weeks after initiation of the feeding regime. Carcass fat, protein, and moisture analyses were made. Liver glucose-6-phosphatase (G-6-Pase), hexose monophosphate (HMP) dehydrogenase, and glycogen were assayed. At the end of four weeks and eight weeks the percentages of fat in the carcasses of these cats were significantly higher than in the cold-exposed rats receiving a mixed complete diet ad libitum. The two enzymes studied showed differing responses, HMP dehydrogenase increasing as a result of higher input of carbohydrate in the cold, and G-6-Pase increasing as an apparent result of cold exposure per se.

FAM

P 148552 FR AMRL TR 66-171 UNCLASSIFIED
Fairchild Hiller Corp., Republic Aviation Div., N.Y., U.S.A. UNLIMITED
MICROBIOLOGICAL FLORA OF HUMAN SUBJECTS UNDER SIMULATED SPACE ENVIRONMENTS (AUG., 1965 - OCT., 1966) 616-008.98 613.693 AF33(615)3255
Riely, P.E., Shorenstein, D.J.
Oct., 1966 217pp.,31ref.

Aerobic and anaerobic microbiological studies were conducted on selected body areas of 11 human male subjects living under controlled conditions. Similar studies also were made on specific objects located in their environmental area. The date from these studies have provided information on microbial dynamics and bacterial levels, as influenced by various personal hygiene procedures and confinement. Microbial studies (both aerobic and anaerobic) of the fecal flora showed the influence of defined space-type diets. A statistical treatment of the data has helped to direct the formulation of personal hygiene procedures that should keep the bacterial populations within a numerically normal range for an individual. This analysis confirmed the importance of the groin and glans penis, as well as the axilla, as the most significant numerical indicator areas of microbial buildup. A detailed study of the predominating fecal anaerobes was conducted to classify these bacteria into recognized generic groups.

FAM

HEALTH AND SAFETY

AD 643871 TR 3484 Rep.8 UNCLASSIFIED
Picatinny Arsenal, Dover, N.J., U.S.A. UNLIMITED
ESTABLISHMENT OF SAFETY DESIGN CRITERIA FOR USE IN ENGINEERING OF EXPLOSIVE FACILITIES AND OPERATIONAL (Jan.-Dec.,1965) 614.835
Rindner, R.M., Wachtell, S., et al
Dec., 1966 193pp.,11ref.

Describes work performed in the following areas:- A model scale slab test programme (1/3 and 1/10 scale) to investigate the response of reinforced concrete to blast loads; a model scale bay test programme to evaluate the explosive capacity of a bay structure and to establish the validity of scaling; a 1/3 scale modified C-13 cubicle test to demonstrate the use of new design and construction techniques; a full-scale test programme to complete the investigation for compartmenting igloos for safe storage of small weapons; and development of new impulse curves in a cubicle type structure.

MHC

AERE TRANSL 1064 UNCLASSIFIED
Atomic Energy Res. Est., Harwell, U.K. UNLIMITED
EXPLOSIONS CAUSED BY LIQUID OXYGEN (Transl. from: Chimie et Industrie 90, (3), 178-183, 1963, France) 661.937-404 614.835
Weber, U.
1966 7pp.

The details are given of 3 serious explosions caused by liquid oxygen in Western Germany. The special safety measures since taken are enumerated.

MHC

P 148602 AECL 2678 UNCLASSIFIED
Atomic Energy of Canada Ltd., Chalk River, Ontario, U.S.A. UNLIMITED
ANALYSIS OF EXTERNAL RADIATION EXPOSURES IN 1966 539.1.047
Knight, G.B., Adair, B. 614.876
Feb., 1967 14pp.,4ref. 621.039.58

An analysis of occupational radiation exposures received by workers at AECL sites in 1966 has been carried out by machine accounting methods. Results are presented in tables and graphs.

FAM

P 148895 AECL-2656 UNCLASSIFIED
Atomic Energy of Canada Ltd., Chalk River Nuclear Labs., Ontario, Canada UNLIMITED
ONE-DAY INTRODUCTION TO RADIATION 614.876
PROTECTION PRINCIPLES 374.5
Fenn, J.H., Bush, W.R., et al. 621.039.58
April, 1967 39pp.

The fundamentals of radiation hazards and their control are outlined. This one-day course is presented to all classes of radiation workers at CRNL, usually during their first month of employment. The purpose of the course are to outline the fundamentals of radiation hazards control, to describe methods that enable employees to work safely with radiation, and to acquaint employees with the CRNL radiation and industrial safety organization.

FAM

MATHEMATICS

NASA TN D-3976 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
STABILITY THEORY OF MULTISTEP METHODS
Keathley, S.M., Aird, T.J. 518.12
May, 1967 54pp.,6ref. 519.722.1
517.949.2

The numerical solution of differential equations of the form $y' = f(x,y)$ using predictor-corrector multistep methods is examined with particular emphasis on the stability concepts. Computational methods for determining the region of stability for single multistep methods and predictor-corrector pairs are expounded. Two subroutines have been written to compute the boundary of the region of stability for the single multistep methods and predictor-corrector pairs.

STB

NASA TR R-262 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
AN OPERATIONAL UNIFICATION OF FINITE DIFFERENCE METHODS FOR THE NUMERICAL INTEGRATION OF ORDINARY DIFFERENTIAL EQUATIONS 518.61
519.281.3
Lomax, H.
May, 1967 112pp.,17ref.

Presents a mathematical procedure which can be used to study and compare various numerical methods for integrating ordinary differential equations. This procedure is relatively simple, mathematically rigorous, and of such a nature that matters of interest in digital computations, such as machine memory and running time, can be weighed against the accuracy and stability provided by the method under consideration.

VJB

P 148570 Rep. 60583 PR AFCRL 67-0153 UNCLASSIFIED
Systems Res. Labs, Inc., Dayton, Ohio, U.S.A. UNLIMITED
TECHNIQUES IN INTRINSIC ANALYSIS
(1.11.1965 - 31.10.1966) 519.241.1
Colomb, R.M. 519.281.2
31.11.1966 70pp.,21ref. 519.722.1
AF 19 (628) 5657

Intrinsic analysis is a data reduction technique which allows a set of data vectors to be approximated to a given mean square error by a minimum number of coefficients. Develops the analysis, showing the relation to other developments and proves several results about the relation between the row space and column space of matrices. The problem of error propagation and control is considered from several points of view and the effect of ambiguous data on the algebraic eigenvalue problem discussed. Finally, a survey is made of computational algorithms for the algebraic eigenproblem for large ambiguous second moment matrices, and two new algorithms proposed: one for very large matrices and the other for complex hermitian matrices.

VJB

P 148627 RM 3366 PR UNCLASSIFIED
Rand Corp., Santa Monica, Calif., U.S.A. UNLIMITED
DERIVATION OF ESTIMATING RELATIONSHIPS: AN
ILLUSTRATIVE EXAMPLE 519.651
Fisher, G.H.
Nov., 1962 83pp.

Presents illustrative examples of how statistical regression analysis may be used to derive estimating relationships from historical data. The specific illustration pertains to estimating relationships for airframe initial tooling cost as a function of aircraft performance and physical characteristics. Examples of simple linear regression, logarithmic linear regression, second degree regression, and multiple linear regression analyses are presented and discussed.

VJB

COMPUTERS & DATA PROCESSING

P 148937 ESRO TM-52 (ESDWC) UNCLASSIFIED
European Space Res. Organisation. Paris, France UNLIMITED
SOME CHARACTERISTICS OF HARDWARE AND SOFTWARE
OF THIRD GENERATION COMPUTERS 681.3 (083.7)
Dec., 1966 10pp.

It is the purpose of this paper to clarify some technical terms used with large scale computers. Although the terms are not defined and are often therefore used in a confusing manner, it is beneficial to explain the terms in this paper according to current conventions.

VJB

NASA TN D-3988 UNCLASSIFIED
National Aer. & Space Admin., U.S.A. UNLIMITED
APPLICATION OF THE STORED-PROGRAM COMPUTER
SCIENTIFIC SPACECRAFT 681.3 :629.78
Cliff, R.A.
June, 1967 12pp.,7ref.

Stored-program computers have not yet been used in small scientific spacecraft. The evolution of spacecraft data systems indicated that inclusion of a computer is a logical next step. The computer would be used for four types of computation: buffering data, formatting data, redundancy removal, and parameter extraction. The most important advantage of using a computer is the flexibility obtained from using a stored program rather than a wired one.

VJB

P 148689 Rep. 67-09 NSTIC/09524/66 UNCLASSIFIED
Pennsylvania Univ., Moore School Of Electrical Engineering, Philadelphia U.S.A. UNLIMITED
AUTOMATIC INTRODUCTION OF INFORMATION INTO A REMOTE-ACCESS SYSTEM: A PHYSICS LIBRARY CATALOG 681.3.025 025.5
Gabrini, P.J. NONR 551 (40)
1.11.1966 76pp.,6ref.

The objective of this work is twofold: First, to develop generalized programs and procedures for accepting large volume information and incorporating it automatically into the files of the Multilist system; second, to demonstrate by a specific example the special advantages of use of the query language, file directories and file Multilist structure. The example is an automated library catalogue which has been created in this system by introducing into the mass memory a large collection of Physics articles already used for a similar purpose by the M.I.T. Technical Information Project; however, a program had to be written to change their format. A second, more general program was written which enters items into the Multilist system.

VJB

P 148424 NRL Rep.6531 UNCLASSIFIED
Naval Res. Lab., Washington, D.C., U.S.A. UNLIMITED
MULTIPROCESSOR OPERATING SYSTEMS
Wald, B. 681.3.025
11.4.1967 28pp.,55ref. 519.283

The history and present status (1965) of multiprocessing, multiprogramming, and timesharing are reviewed. It is concluded that, despite their diverse histories, these techniques are destined to be intertwined. Although the mechanical problems in operating systems that exploit these techniques have largely been solved and the difficult memory allocation problem is on the brink of solution, the important question of optimum operating system strategy in initiating, suspending, and terminating jobs is largely unexplored. Suggestions are made concerning models which might be suitable for both analytic and Monte-Carlo approaches to the optimization of operation system strategy and to the selection of optimum hardware mixes.

VJB

P 148372 SCI. Rep. 1 AFCRL-67-0045 UNCLASSIFIED
Parke Mathematical Labs, Inc., Carlisle, Mass, U.S.A. UNLIMITED
A STUDY OF ERROR CORRECTING CODES, III: SYCHRONIZABILITY AND COMMA FREEDOM 681.3.045 F19628670030
Arquette, L., Calabi, L., et al.
Dec., 1966 21pp.,4ref.

Synchronizable error-correcting and comma-free correcting codes are characterized. Three comparison tables for code properties are given.

VJB

P 148373 Sci. Rep. 2 AFCRL-67-0124 UNCLASSIFIED
Parke Mathematical Labs. Inc., Carlisle, Mass, U.S.A. UNLIMITED
A STUDY OF ERROR-CORRECTING CODES. IV: CODE PROPERTIES AND UNAMBIGUOUS SETS 681.3.045 F19628670030
Calabi, L., Hartnett, W.E.
Feb., 1967 13pp.,5ref.

The concept of unambiguity of a set is introduced using the notion of scansions of sequences. The concept provides characterizations of irredundance, correctability, decodability, and synchronizability for codes.

VJB

NASA TN D 3981 — UNCLASSIFIED
National Aero. & Space Admin., U.S.A. — UNLIMITED
STARS II. A FULLY AUTOMATIC SATELLITE DATA PROCESSOR — 681.3.05
Keipert, F.A., Lee, R.C., et al. — 621.398
May, 1967 17pp.,2ref.

The "Satellite Telemetry Automatic Reduction System" (STARS II), is a fully automatic computer controlled telemetry data processor. Each system incorporates a CDC 3200 computer as its central element, together with facilities for converting and processing telemetry data and ground station time inputs, plus a full complement of simulation equipments. The objectives of STARS II are to maximize data recovery, reduce turn-around time, increase flexibility, and improve operational efficiency. These systems encompass advanced techniques for computer controlled data processing of high-volume telemetry data.

AERE R 5478 — UNCLASSIFIED
Atomic Energy Res. Est., Harwell, U.K. — UNLIMITED
FMLS, A FULL-MATRIX LEAST SQUARES PROGRAM FOR CRYSTAL STRUCTURE REFINEMENT — 548.7
Bracher, B.H., Taylor, R.I. — 681.306 FORTRAN
May, 1967 58pp.,10ref.

Describes a FORTRAN computer program for the refinement of crystal structures using full-matrix least squares with X-ray or neutron data: the program is one of a series for structure determination with compatible input and output. Details of the use of the program, a listing and glossary are given. The use of a second program, TAPEDIT, for handling reflection data on magnetic tape for input to FMLS, is described in an appendix to the report. Program decks are available from the authors.
(HSO 8/-) FAM

P 148562 TM-738/029/00 SCI.REP.3 AFCRL 67-0078 — UNCLASSIFIED
UNLIMITED
System Dev. Corp., Santa Monica, Calif., U.S.A.
ONE-WAY REAL-TIME LIST-STORAGE LANGUAGES — 681.3.06
Ginsburg, S., Harrison, M.A. — 621-52
3.1.1967 44pp.,12ref. — 681.39((007.52))
AF AFOSR 1203-67
F 1962867 C 0008

A device is presented which has its memory organized as a list. Attention is then focused on the automaton (called an lsa) which results when the input is read one-way and the device operates in real time. The set of words (called a language) accepted by an lsa is extensively studied. In particular, several characterizations and closure properties of languages are given. (One-way real-time List-Storage Acceptor - lsa)
VJB

P 148546 Sci. Rep. 1 AFCRL 67-0133 — UNCLASSIFIED
Computer Corp. of America, Cambridge, Mass., U.S.A. — UNLIMITED
SCENE ANALYSIS USING THE CONCEPT OF MODEL — 681.3.06 CONVERT
Guzman, A. — 621.397.331
30.1.1967 76pp.,9ref. — AF 19(628)5914

A symbolic notation (FDL-1) for the description of pictures composed of rectilinear segments is developed. Visual objects, aggregates of objects (scenes) and generalized classes of objects (models) may be expressed in this notation. A program is described which, given a scene S and a model of an object O, finds all instances of O in S. (O and S are expressed in FDL-1). The program written in the language CONVERT, can identify overlapping objects when they are transparent. Examples are given.
VJB

AD 643084 SA-TR20-2818 UNCLASSIFIED
Springfield Armory, Mass., U.S.A. UNLIMITED
FORTRAN PROGRAM FOR CALCULATING PROBABILITY
OF A HIT ON A SQUARE TARGET 681.3.06 FORTRAN
Lundy, N.E. 623.55.024.2
15.9.1966 35pp.

Probability of a hit by a single shot or by a ten-shot burst at direct or angular approach to a square target is calculated. Parameters include dispersion in mils, distance from the target in meters, and size of the target in feet. A normal distribution is assumed. Solution by linear interpolation of normal curve areas from standard tables was accurate to 0.0002 when contrasted with integration of the normal curve by Simpson's 1/3 rule in sample problems.

VJB

NASA CR 72124 N67-12097 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
COMPUTER PROGRAM FOR THE ANALYSIS OF
FILAMENT-REINFORCED METAL-SHELL PRESSURE 681.3.06
VESSELS 621.642-186.5
Darms, F.J., Londos, R.E., et al. 669.018.95
May, 1966 410pp.

The purpose of the computer program is to perform calculations for the design and structural analysis of pressure vessels fabricated from filament-reinforced metal shells using equations presented. Design and analysis calculations include: (a) Solution of force equilibrium and strain compatibility equations at the equator of the heads. (b) Calculation of parameters describing head contours and the cylindrical section. (c) Determination of stresses and strains at all points on the head contour and in the cylindrical section resulting from various combinations of pressures and temperatures. (d) Computation of rating properties of the entire vessel and its components. The program is written in FORTRAN IV.

FAM

P 148405 AECL 2621 UNCLASSIFIED
Atomic Energy of Canada Ltd., Chalk River, UNLIMITED
Ontario, Canada
MODIFYING THE PDP-8 DIGITAL COMPUTER FOR 681.31 PDP-8
INDEXED ADDRESSING TO AIR PROGRAMMING 681.3.06
Morin, K.R., Leightstone, A.D.
Feb., 1967 11pp.,1ref.

The program limitation of the PDP-8 digital computer due to its 128 word "page" size is discussed. In order to overcome this limitation the computer was modified to allow a type of indexed addressing, whereby an external 12 bit Index Register defines the starting address of a block of memory 128 words long. This block or "floating page" can be referenced from anywhere in memory, but only by the four instructions: AND, TAD, ISZ and DCA, when the "page bit" of the instruction is a 1 and the external one bit Mode Register is set for modified (indexing) operation.

VJB

P 148370 Sci.Rep.2 AFCRL-67-0185 UNCLASSIFIED
Electronic Associates Inc., Computation Center, UNLIMITED
Princeton, N.J., U.S.A.
RESEARCH AND DEVELOPMENT OF ANALOG MODELS 681.33
Maslo, R.M. 681.3.02
15.3.1967 128pp.,2ref. 538.566
533.951
521.42
AF19(628)-5043

Ten problems were submitted during the year. They were from the fields of electromagnetic ray propagation, mathematics, magneto-hydrodynamic shock wave theory, biomedical-engineering, satellite dynamics and orbital mechanics.

VJB

P 148561 TM-738/028/00 SCI.REP.2 UNCLASSIFIED
AFCRL 67-0077 UNLIMITED
System Dev. Corp., Santa Monica, Calif., U.S.A.
A GENERALIZATION OF CONTEXT FREE 681.39 ((007.5))
DETERMINISM AF AFOSR 1203-67
Hibbard, T.N. F 1962867 C 0008
21.11.1966 67pp.,7ref.

Nondeterministic Turing machines, under the restriction that each square be written on only a fixed number of times, recognize all and only context free languages. The deterministic subclass gives rise to a hierarchical extension of the pushdown deterministic languages. Unambiguity in terms of the machines is the same as grammatical unambiguity.

EHR

AD 427771 FR ASD TDR 63-664 UNCLASSIFIED
Vol.6 UNLIMITED
Adaptronics Inc., Alexandria, Va., U.S.A.
THEORY OF PROBABILITY STATE VARIABLE SYSTEMS 681.39 ((007.52))
VOLUME 6: PERCEPTION, DECISION-MAKING, AND 159.937
ACTION 159.955
Lee, R.J. AF 33(657)-7100
Feb., 1963 192pp.,21ref.

Discusses approaches whereby neurotron networks can be used to provide pattern recognition, autonomous decision-making, and action. The versatility of neurotron networks, and their potential application to actual problems, is demonstrated. To illustrate pattern recognition, an artificial fovea with jitter analogous to the human eye is described, and the way in which this together with a neurotron network, can learn to assign meaning to symbols, including the ability to learn to recognise handprinted letters is discussed. To illustrate autonomous decision-making, it is shown how a neurotron network can develop its own strategy for playing chess. To illustrate action, it is shown how a neurotron network can learn to control an arm and hand with visual, tactile, and kinaesthetic feedback, and it ish shown how a neurotron network can learn to drive suitable output devices to mimic a simple tune.

RHH

ASTRONOMY & CARTOGRAPHY

P 148936 ESRO SN-52 UNCLASSIFIED
European Space Res. Organisation, Paris, France UNLIMITED
ON THE COLLECTION OF COSMIC DUST SAMPLES FOR
CRYSTALLOGRAPHIC STUDY 523.16
Kerridge, J.F. 539.27
April, 1967 25pp.,3ref. 537.533

Selected area electron diffraction is the only available technique capable of yielding crystallographic information from sub-micron particles such as are found in cosmic dust samples collected from high altitudes. Problems of handling the particles require that they be collected directly on the surfaces upon which they will subsequently be examined. Criteria for the selection of suitable surfaces are discussed and some possible experimental arrangements are assessed both theoretically and on the basis of a series of practical tests. As a result of these investigations the favoured arrangement takes the general form of a film of aluminium evaporated on to a bonding medium lying on a firm substrate. The bonding medium is dissolved away following the sampling flight, freeing the aluminium film, with its adhering particles, and allowing it to be mounted in the electron diffraction camera.

P 148693 FR AFCRL 67-0154 UNCLASSIFIED
Honeywell Inc., Radiation Center, Boston, Mass., UNLIMITED
U.S.A.
SOLAR BEAM MEASUREMENTS STUDY 523.72
(JULY, 1965 - DEC., 1966) AF19(628)-5210
West, C.N., Kilinski, R.S.
Feb., 1967 125pp.,7ref.

The Evans-Newkirk Photographic sky photometer, the Eppley Ångström Pyrheliometer, the Eppley Normal Incidence Pyrheliometer, the Block Interferometer spectrometer and the Harvard-Evans Visual Sky Photometer were evaluated to determine the equipment and methods which produce the greatest precision in measuring solar irradiance. This evaluation consisted of theoretical analyses and laboratory tests as well as field use of the instruments. The report describes the procedures which were used, the auxiliary equipment which was found best and the precision which was measured with the field tested instruments.

CEP

P 148460 FR AFCRL 67-0106 UNCLASSIFIED
Geo-Science, Inc., Alamogordo, N.Mex., U.S.A. UNLIMITED
SOLAR RESEARCH AND DEVELOPMENT AT SACRAMENTO
PEAK OBSERVATORY (1.1.1964 - 31.12.1966) 523.74
Jones, M.W. AF 19(628) 3853
Jan., 1967 20pp.
Summarises the work of the laboratory which includes studies of events preceding solar flares such as filament and place activity, solar surges, and H alpha activity with the object of increasing the reliability of predicting solar flares. Development of special instrumentation and related control systems is also described.

PEP

P 148695 SR 12 AFCRL 67-0035 UNCLASSIFIED
Harvard Univ., Harvard Coll. Observatory, UNLIMITED
Cambridge, Mass., U.S.A.
CLASSIFICATION OF SOLAR PROMINENCES FOR 523.74
SUNSPOT CYCLE NO. 19 - 1964 AF19(628)-3322
Menzel, D.H., Jones, F.S.
Dec., 1966 91pp.
Contains a tabulation and analysis of the behaviour classification of prominences observed during 1964 at the Sacramento Peak Observatory, Sunspot, New Mexico.

CEP

NASA TR R-257 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
AN ANALYTICAL APPROACH TO THE DETERMINATION OF
STELLAR FIELDS OF VIEW 523.821
Kleiman, L.A., Arehart, R.A.
June, 1967 30pp.,6ref.
Describes a scheme to determine the size of the circular field of view that is both necessary and sufficient to include at least some specified number of stars from a given set, independent of the orientation of the field within the celestial sphere. A geometrical proof of the scheme is presented, and all equations needed to effect the scheme are derived. The scheme is thus shown to be entirely analytical and to involve no assumptions concerning the distribution of the stars. Numerical results are presented in which the 1064 stars brighter than, or equal in brightness to, an apparent visual magnitude of +4.7 are considered.

VJB

P 146475 TM F39 UNCLASSIFIED
European Space Vehicle Launcher Dev. UNLIMITED
Organisation, Paris
THE FLATNESS OF THE EARTH 525.233
Cambi, E.
1967 15pp.
The flatness of a homogeneous body having the same potential as the earth (to speak of the "form of the earth" has not much meaning because it is not homogeneous) has two different values according to whether the observer is or is not attached to the earth and subject to its centrifugal force. It is easy to formulate the problem in an erroneous manner and to obtain absolutely false values. Various acceptable points of view are discussed.

P 148344 902-F FR AFCRL-67-0100 UNCLASSIFIED
Allied Res. Associates, Inc., Geophysics Div., UNLIMITED
Concord, Mass., U.S.A.
APPLICATION OF DOPPLER RADAR TO STORM DYNAMICS 621.396.962
(DEC., 1963-DEC., 1966) 551.501.81
Wexler, R. U 492:494
20.2.1967 63pp.,14ref. AF 19(628)-3893

Contents:- 1. The variance due to vertical wind shear. 2. Effect of horizontal wind shear on Doppler radar measurements of wind velocity. 3. Rain intensity measurements with Doppler radar. 4. Properties of the wind field derived from Doppler radar observations. 5. Growth of precipitation in model clouds. 6. Measurements of microscale turbulence by Doppler radar in snow.

DMA

P 148514 AFSC No. 189 AFCRL 67-0120 UNCLASSIFIED
Air Force Cambridge Res. Labs., Hanscom Field, UNLIMITED
Mass., U.S.A.
MEAN MONTHLY ATMOSPHERES FOR 15 deg.N 551.506
Cole, A.E. Proj. 8624-01
Feb., 1967 23pp.,11ref.

The family of mean monthly atmospheric models presented in this report describe the vertical distribution of pressure, temperature, and density, at 15 deg.N, from the surface to 80 km. The models are internally consistent and in agreement with observed winds, temperatures, and densities for the region between the equator and 30 deg. latitude. The amplitudes and phase angles of annual and semiannual oscillations in temperature and density at levels between 30 and 80 km are examined. Seasonal variability is less at 15 deg.N than at 30 deg.N. Day-to-day variability of density due to synoptic changes appears to be of approximately the same magnitude as the seasonal variability at this latitude. Observations indicate that densities between 40 and 80 km have a diurnal range of 5 to 10% of the daily mean.

OEP

P 148868 Data Rep. 3 (9) UNCLASSIFIED
National Res. Council, World Data Center, UNLIMITED
Washington, D.C., U.S.A.
METEOROLOGICAL ROCKET NETWORKS FIRINGS 551.507.362.1
Sept., 1966 217pp.

These first issues of the Meteorological Rocket Data Reports are essentially a reprint of the Data Report of the Meteorological Rocket Network Firings, IRIG Document 109-62, issued by the Meteorological Rocket Network Committee (MRNC). Other countries are encouraged to submit their observations to WDC-A for inclusion in this series. Meteorological Rocket Network Stations which have contributed data are listed in an addendum.

VJB

P 148828 ESRO SN-63 UNCLASSIFIED
(ESLAB) UNLIMITED
European Space Res. Organisation, Paris, France
DESCRIPTION OF SCIENTIFIC SOUNDING-ROCKET 629.765
PROJECT C-09 551.507.362.1
Page, D.E. 629.76 ESRO
Feb., 1967 11pp.,8ref.

ESRO sounding-rocket project C-09 is made up of three experiments designed to measure the density of positive ions or of electrons in the D and E regions of the ionosphere during disturbed ionospheric conditions. The onset of an ionospheric disturbance is indicated by the signals of a riometer on the ground. The first experiment uses an impedance probe to measure the instantaneous electron density at the rocket. As a frequency sweep is applied to the capacitor formed by the rocket body and a rod antenna, resonances appear from which the local concentration of electrons can be derived. The second experiment is designed to study positive ions concentration during auroral disturbances. It consists

(continued)

P 148828 (continued)
essentially in a Langmuir probe operated in the region of its characteristic corresponding to "Positive Ion Collection". - The third experiment aims at finding the local electron concentration by measuring the Faraday rotation of a plane-polarised wave transmitted from the ground. To widen the range over which measurements can be made, three separate frequencies are being used.

OEP

P 148829 ESRO SN-61 (ESLAB) UNCLASSIFIED UNLIMITED
European Space Res. Organisation, Paris, France
DESCRIPTION OF SCIENTIFIC SOUNDING-ROCKET 629.765
PROJECT C-21 551.507.362.1
Ortner, J. 629.76 ESRO
Feb., 1967 10pp.,2ref.

Payload C-21, the first to be launched from Kiruna, was specifically designed to study the relation between proton fluxes of different energies and intensity variations of auroral light. It included two experiments: (a) a Geiger-Müller counter experiment to measure protons in the 12-28 MeV, 28-60 MeV and 12-60 MeV ranges; (b) a Far Ultraviolet monochromator to explore the region between 1200 and 3000 Å.

OEP

P 148830 ESRO SN-66 (ESLAB) UNCLASSIFIED UNLIMITED
European Space Res. Organisation, Paris, France
DESCRIPTION OF SCIENTIFIC SOUNDING-ROCKET 629.765
PROJECT S-08 551.507.362.1
Jaeschke, R. 629.76 ESRO
Feb., 1967 7pp.

ESRO sounding-rocket payload S-08 is comprised of two experiments. The first aims to create an artificial cloud of Ba ions in the ionosphere, with a view to preparing a future space probe experiment for the study of the interplanetary medium, using an ionized cloud as the probing agent. The other experiment is designed to measure the vertical distribution of ozone in the atmosphere between 30 and 80 km. Although present in very minute quantities, ozone plays a crucial role in the temperature distribution in the stratosphere and mesosphere. Its concentration can be calculated by measuring the attenuation of the solar ultraviolet radiation through

(continued)

P 148830 (continued)
successive layers of the atmosphere. Two independent detectors are employed: a photocell with a wide field of view, and a photomultiplier equipped with an interference filter. In addition to its scientific payload, the rocket contained some technological sensors to report on the vibration level and on the temperature at various points inside the nose cone.

OEP

P 148827 ESRO SN-67 (ESLAB) UNCLASSIFIED UNLIMITED

European Space Res. Organisation, Paris, France.

DESCRIPTION OF SCIENTIFIC SOUNDING-ROCKET 629.765

PROJECT S-18 551.507.362.1

Jaeschke, R. 541.14

Feb., 1967 6pp.,6ref. 523.6

To elucidate the role played by photochemical processes in cometary tails, a cloud of NH_3 is ejected at an altitude of about 200 km, under twilight conditions. The fluorescence spectra of NH_2 and NH under the action of solar radiation are observed from the ground by means of a variety of spectrographs. The study of the variations of the spectral intensities for the two radicals will lead, it is hoped, to a better understanding of the dissociation and ionisation mechanism in such a cloud. The filming of the explosive and diffusive phases of the NH_3 cloud also yields information on the physical properties of the upper atmosphere. In addition to its scientific payload, the rocket included some technological sensors (acceleration, pressure, temperature) whose data were telemetered to the ground throughout the flight.

OEP

P 148369 Sci.Rep.1 AFCRL-67-0055 UNCLASSIFIED UNLIMITED

Northeastern Univ., Boston, Mass., U.S.A.

PROBLEMS OF INSTRUMENTATION IN SPACE RESEARCH

Cochrun, B.L., Nardone, L.J. 551.507.362.1

15.12.1966 15pp.,22ref. 551.507.362.2

629.785

AF19(628)-3876

A survey of some of the problems facing the researcher in the upper atmosphere and outer-space is presented. Consideration is limited to the payloads carried on sounding-rockets, satellites and deep-space probes. Emphasis is placed upon the unique instrumentation restraints due to the environment of space and the vehicle. The conclusion is drawn that the stress upon smaller packages and reduction of power requirements will continue for some time to come.

WJB

P 148343 F.Sci.Rep. AFCRL-67-0029 UNCLASSIFIED UNLIMITED

New Mexico Univ., Physics & Astronomy Dept., Albuquerque, U.S.A.

FURTHER APPLICATIONS OF THE CHEMILUMINESCENT METHOD FOR THE MEASUREMENT OF ATMOSPHERIC OZONE (1.5.1963-31.10.1966) 535.379

546.214

551.510.534

Regener, V.H. AF 19(628)-2927

16.1.1967 21pp.

This Final Report reviews the general objectives and achievements of the contract work. Some refinements and some new applications of the chemiluminescent method for the measurement of atmospheric ozone are described. These include an improved balloon sonde with variable resistance output, and an aircraft-borne ozone recorder with in-flight calibration. Other parts of the contract work, such as participation in the AFCRL ozone network programme, and research into the structure and variability of vertical ozone distribution data have been published previously. These are included in this report by reference only.

FAM

P 148666 FR AFCRL 67-0128 UNCLASSIFIED UNLIMITED

California Univ., Meteorology Dept., Los Angeles, U.S.A.

DIAGNOSTIC STUDIES OF WEATHER SYSTEMS OF LOW AND HIGH LATITUDES (ROSSBY NUMBER - 1) (30.11.1964 - 30.11.1966) 551.511.33

551.515.21

551.515.51

Krishnamurti, T.N. AF 19(628)-4777

April, 1966 360pp.,52ref.

A theory of a general balance model for small Rossby numbers, including effects of latent heat, friction and terrain, is presented with some applications in high and low latitudes.

RGF

P 148515 IP No. 128 AFCRL 67-0147 UNCLASSIFIED
Air Force Cambridge Res. Labs., UNLIMITED
Hanscom Field, Mass., U.S.A.
DETERMINING THE DEGREE OF AMBIGUITY IN FROST 536.423.45
POINT TEMPERATURES AS MEASURED BY AN OPTICAL 551.524.37
DEW POINT SENSOR 536.421.4
Peirce, R.H., Guenthner, R.H. Proj. 6670-04
March, 1967 13pp.,10ref.

The design and use of optical dew point sensors has raised questions concerning the ambiguity which might occur if measurements are made while the instrument is controlling on a supercooled dew layer at temperatures below freezing. This report outlines the theory of operation of one of these sensors and discusses the procedures and results of an extensive evaluation programme to resolve these questions. It is an optically sensed, cooled-mirror dew point device utilising a proportionally controlled feedback loop to maintain the mirror at a temperature that permits the liquid (or solid) and vapour phases of water to exist in equilibrium. The tests were performed to determine if ambiguous readings, caused by the presence of supercooled water on the mirror at temperatures below freezing, could occur and over what temperature range this supercooled layer might be expected.

CEP

P 148470 AFCRL 67-0015 ENVIRONMENTAL RES. PAPS. 255 UNCLASSIFIED
UNLIMITED
Air Force Cambridge Res. Labs., Hanscom Field,
Mass., U.S.A. 621.396.962
A PRELIMINARY REPORT ON DOPPLER RADAR 551.55
OBSERVATION OF TURBULENCE IN A THUNDERSTORM 551.515
Donaldson, R.J. U-494:492
Jan., 1967 28pp.,10ref.

Vertical-incidence observations by Doppler radar of velocities in a thunderstorm reveal some regions in which the spread of velocities is unusually broad. The widths of the vertical velocity spectra are generally greatest along the edges of a major updraft, where the maximum shear in updruft speed also occurs. The observations indicate that turbulence is an important cause of the abnormally wide velocity spectra, and suggest the utility of Doppler radar measurements of the vertical velocity spectrum as an indicator of severe cloudy-air turbulence. Furthermore, vertical velocity spectra in the more convective regions of thunderstorms, where they may be seriously affected by turbulence and wind shear, probably give an exaggerated picture of the particle size distribution.

DMA

NASA TT F-472 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
EXPERIMENTAL CALCULATION OF THE RECURRENCE OF
TEMPERATURE AND WIND VELOCITY COMBINATIONS IN THE 551.558.1
LOWER 100-M LAYER OF THE ATMOSPHERE (Transl. from: 551.524.77
OPYT RASCHETA POVTORYAYEMOSTI KOMPLEKSA
TEMPERATURY I SKOROSTI VETRA V NIZHNEM
100-METROVOM SLOYE ATMOSFERY. VOPROSY KLIMATOLOGII
(PROBLEMS IN CLIMATOLOGY), Trudy Nauchno-
Issledovatel'skogo Instituta Aeroklimatologii,
(37) 62-82, 1966, U.S.S.R.)
Solokha, T.F.
May, 1967 24pp.,15ref.

Approximate computations of the frequency of occurrence of a combination of temperature and wind velocity at heights of 50 and 100 m are given on the basis of surface data.

ROF

P 148401 Res.Rep.226 UNCLASSIFIED
Army Cold Regions Res. & Engineering Lab., UNLIMITED
Hanover, N.H., U.S.A.
THE SINTERING PROCESS IN SNOW 551.578.4
Ramseir, R.O., Keeler, C.M.
Feb., 1967 4pp.,1fig.,11ref.

The process by which ice and snow particles bond together at temperatures below the melting point has been termed "sintering" by analogy with the phenomenon known in powder metallurgy. To elucidate the bonding mechanism the unconfined compressive strength of two groups of snow samples was determined as a function of time. One group was allowed to sinter under atmospheric conditions while the other group was kept immersed in silicone oil. The much lower rate of strengthening of the latter group suggests that evaporation-condensation must be the major mechanism of mass transport in snow under atmospheric conditions. The possible magnitudes of the various mass transfer coefficients are discussed.

EHR

P 149037 AFCRL 67-0115 AFBO 190 UNCLASSIFIED
Air Force Cambridge Res.Labs., Bedford, Mass, U.S.A. UNLIMITED
MESOSCALE STRUCTURE OF THE ATMOSPHERE IN REGIONS OF
CLEAR-AIR TURBULENCE, VOL.1 551.584.1
Penn, S., Pisinski, T.A. 551.551.5
April, 1967 93pp.,5ref.

The mesoscale structure of the atmosphere in regions of Clear-Air Turbulence (CAT) is investigated by means of aircraft observations of wind, temperature and ozone obtained in the upper troposphere and in the lower stratosphere. Analysis from five CAT missions are shown, including vertical cross sections normal to flow patterns and also detailed vertical "soundings" of wind, temperature, and the Richardson number. A verification is obtained at intervals of 1000 ft between the occurrence of CAT and a Richardson criterion of 0.5. Over 70% of the 149 CAT cases are correctly specified by the criterion.

RGF

P 148347 FR AFCRL-67-0028 UNCLASSIFIED
Geo-Science, Inc., Alamogordo, N.M., U.S.A. UNLIMITED
AIRGLOW OBSERVATIONS AND RESEARCH (1.4.1965-30.9.1966)
Jones, M.W. 551.593.5
Dec., 1966 32pp.,8fig.,7ref. AF 19(628)-5062

Airglow observations are reported for the period April, 1965 to September, 1966 from the observatory at Sacramento Peak, New Mexico. Studies were made of the oxygen lines at 5577 and 6300 A, and of the sodium doublet at 5890-5896 A with a birefringent filter photometer. Studies of the data showed no significant difference in the diurnal variation of zenith 5577A for the years 1957-59, sunspot maximum, and 1962, sunspot minimum.

EHR

P 148335 Sci.Rep.1 AFCRL-67-0042 UNCLASSIFIED
General Dynamics, Convair Div., San Diego, Calif., U.S.A. UNLIMITED
AIRCRAFT INSTRUMENTATION TO MEASURE CLOUD REFLECTANCE 551.593.65
PROPERTIES AND THE ATMOSPHERIC ATTENUATION OF SOLAR 551.576
AND INFRARED ENERGY 629.73 DC-3
Marggraf, W.A., Griggs, M. AF 19(628)-5517
Nov., 1966 76pp.,6ref.

A DC-3 aircraft was instrumental to take data of solar-radiated and earth-emitted energy at different levels of altitude over, below and within stratiform clouds and above earth-surface features, such as water, sand, grass, forest, snow and ice. A photometric polarimeter was designed and built to measure the cloud-reflected spectral radiance and polarisation. Other measurement instruments included are up- and down- reading pyranometers, infrared radiometer and spectrometer, cloud particle sampler, liquid-water-content meter, and cloud-visibility indicator.

VJB

GEOLOGY & GEOPHYSICS

P 148664 Rep.46 AFCRL 67-0141 UNCLASSIFIED
Ann.Summ.Rep.1 UNLIMITED
Uppsala Univ., Seismological Inst., Sweden
SEISMIC BODY WAVES AND SURFACE WAVES 550.34
(1.1.-31.12.1966)
Bath, M.
120pp.,

Includes: Particle motion; Spectral analysis; Relations to focal mechanism; Phase correlations; Depth phases; Core phases; Channel waves in relation to higher mode waves; Magnitudes; Signal and noise.

VJB

P 148950 TR 164 UNCLASSIFIED
Army Cold Regions Res.& Engineering Lab., Hanover, N.H., U.S.A. UNLIMITED
ICE SURFACE MOVEMENT ON THE TUTO RAMP IN NORTH GREENLAND 551.32
Davis, N.M. 624.14.(988)
March, 1967 24pp.,6ref. 625.74

In a study of road construction on glacier ice, a programme of measurements of the horizontal and vertical movement of the surface of the ice has been conducted. This report covers measurements from 1956 through to the 1963 thaw season. The measurement procedure is described, and the movement data are tabulated. Appendixes present short-term horizontal movement measurements and station elevations. The rate and direction of both the vertical and horizontal movement on the Tuto ramp are fairly consistent on an annual basis. The upward vertical movement from Station 20.00 to 58.00 on the original Ramp Road is probably caused by the ice upthrust over a stagnant wedge of ice at the edge of the glacier.

CEP

TIL/OT/8547 NRC-TT-1267 UNCLASSIFIED
National Research Council, Canada UNLIMITED
PRINCIPLES OF GEOCRYOLOGY (PERMAFROST STUDIES) PART II, ENGINEERING GEOCRYOLOGY CHAPTER X, USE OF ICE, SNOW AND FROZEN SOIL IN ENGINEERING STRUCTURES. (Transl. of p.267-283 of publ. of Academy of Sciences of the U.S.S.R. V.A. Obruchev Institute of Permafrost Studies Moscow, 1959) 551.345
Voitkovskii, K.F., Krylov, M.M.
1967 22pp.,6ref.

Reviews the use of ice, snow and frozen soil as construction materials in permafrost regions. The design and construction of engineering structures of snow, ice and frozen soil are described. The chapter concludes with a discussion of the construction and operation of ice-walled storehouses.

STB

FLUID DYNAMICS

NASA TN D 3999 UNCLASSIFIED
National Aero.& Space Admin., U.S.A. UNLIMITED
EFFECTS OF COMBINED BUOYANCY AND SHEAR ON WEAK HOMOGENEOUS TURBULENCE 532.517.4
Deissler, R.G. 532.516
May, 1967 27pp.,11ref. 532.526.7

A simplified model is analyzed in order to give some insight into the effects of buoyancy and shear flow on turbulence. Two-point correlation equations, which contain mean velocity and temperature gradients, as well as body force terms, can be constructed from the Navier-Stokes, energy, and continuity equations. While previous papers by the author considered the effects of shear and buoyancy separately, the present paper considers their combined effects. In that case the ratio of buoyancy to shear effects, as given by the Richardson number, is a consideration. The velocity and temperature gradients, aswell as the body force, are considered to be vertical and uniform.

ROF

AD 400567 FR AFCRL 63-238 UNCLASSIFIED
Meteorology Dept., Los Angeles, U.S.A. UNLIMITED
INSTABILITY OF STRATIFIED SHEAR FLOW
Hulmbog, J. 532.521
March, 1963 91pp.,9ref. 532.517.43
532.518
AF19(604)-7999

An attempt to exhibit the similarity of the physical mechanism of the instability in different modes, which is sometimes hidden in the classical treatment of the subject. The analysis uses the method of symmetric waves in which the instability is studied as an initial value problem instead of deriving the instability from the properties of the normal modes of the system.

ROF

P 146776 UTIAS TN 68 AFOSR 67-0004 UNCLASSIFIED
Toronto Univ., Inst.for Aerospace Studies, Canada UNLIMITED
THE FLAT-PLATE MAGNETOHYDRODYNAMIC BOUNDARY LAYER IN A TRANSVERSE MAGNETIC FIELD 532.526.72
Dukowicz, J.K. 533.95((538.4))
Jan., 1967 19pp.,7ref. AF-AFOSR 366-66

The equations of motion for a flat plate boundary layer flow of an incompressible, electrically conducting fluid in the presence of a transverse magnetic field moving with the main stream velocity have been solved numerically for the case of negligible induced magnetic field. The equations of motion have been transformed into a universal form with no characteristic parameters present. The velocity profiles have been calculated as they range from the Blasius profile to the asymptotic exponential profile. The asymptotic profile is reached in a distance $x_1 \simeq 4U/\sigma B^2$ from the leading edge. The error due to the finite-difference solution has also been calculated.

ROF

P 149091 Rep.7 PR 3 UNCLASSIFIED
Kansas Univ., Center for Res. in Engineering Sciences, Lawrence, U.S.A. UNLIMITED
A STUDY OF FLOW THROUGH ABRUPT TWO-DIMENSIONAL EXPANSIONS: FORMATION OF VORTICES 532.527
532.517.43
Sanford, C.L. 532.556.2
1.1.1961 21pp., 4ref.

An investigation of the characteristics of vortices which occur along the surfaces of separation at abrupt, two-dimensional expansions is reported. The frequency of occurrence, spacing, and velocity of translation of vortices have been determined for different expansion ratios. Attempts to determine the velocity distribution in a single vortex are described.

ROF

P 148565 FR AFCRL 67-0166 UNCLASSIFIED
Brown Univ., Physics Dept., Rhode Island, U.S.A. UNLIMITED
RESEARCH ON FLUID DYNAMICAL MODELS OF THE LARGE SCALE ATMOSPHERIC CIRCULATIONS (1.1.1965-31.3.1967) 532.527.2
Snyder, H.A. 532.526
April, 1967 91pp.,39ref. 532.517.43
AF 19(628)4783

The computations for the case of isothermal flow between concentric rotating cylinders has been carried out using Stuart & Watson's method and one of the investigations described here is an experimental verification of the theoretical predictions. It is also shown that a logical extension of the theory requires the existence of jets and shock-like structure in the flow field and these features are demonstrated experimentally. In a second investigation it is shown strongly affected by horizontal shear. Horizontal shear has a strong stabilizing effect on baroclinic waves. The third set of experiments demonstrates the strong stabilizing action of high polymer non-Newtonian fluids.

ROF

P 148943 DRL FB 67-31 DVL Ber.608 UNCLASSIFIED
Deutsche Versuchsanstalt fur Luft-und Raumfahrt, Germany UNLIMITED
ON THE BREAK-UP OF A LIQUID JET IN A REGULAR SEQUENCE OF UNIFORM-SIZED LIQUID DROPLETS 532.529.6
621.454.032.8
(BETRACHTUNGEN ZUM ZERFALL EINES FLÜSSIGKEITSSTRAHLES IN EINE REGELMÄSSIGE FOLGE GLEICH GROBER TROPFEN)
(Report in German)
Wiegand, H.
May, 1967 45pp.,17ref.

A comprehensive summary is given of the conditions in which sequences of drops of uniform size, uniformly spaced and moving at the same speed may be produced. This is applied to calculations on water, gas-oil and glycerine, liquids a wide range of viscosity and surface tension.

NASA CR 77271 N66-34607 UNCLASSIFIED
National Aero.& Space Admin., U.S.A. UNLIMITED
STUDY OF PRESSURE LOSSES IN TUBING AND FITTINGS
FINAL REPORT 1ST JUNE 1964-1ST JUNE 1966 532.542.1
Bouchillon, C.W., Carley, C.T. Jr. 532.543.6
108pp.,60ref. 532.526.7

One of the major results of the study is an empirical equation which predicts the friction factor for flow through flexible metal hoses of various geometric configurations. Another result is a computer program for prediction of the performance of a generalized system for steady state and slow transient, i.e., quasi-steady state phenomena which may be applied to many configurations, including systems with flexible corrugated metal hoses in them.

RGF

AD 644237 MEL R & D Rep. UNCLASSIFIED
380/66 UNLIMITED
Navy Marine Engineering Lab., Annapolis, Md., U.S.A.
DEVELOPMENT OF TOWED IMPELLER SPEED SENSORS FOR 532.575.56
CALIBRATING SHIPS' ELECTRO MAGNETIC LOGS, PHASE III S-F013-09-01
Laster, D.R.
Jan., 1967 31pp.,3ref.

A prototype towed impeller speed sensor was developed by MEL for use as a speed reference in the calibration of ships' electromagnetic logs. The calibrator provides a simple, practical method for ships' speed calibration to within ±0.3 knot (from 4 to 25 knots) provided compensating runs (equivalent to measured-mile techniques) are used to minimize the effects of current gradients and wind. Each sensor must be calibrated individually to obtain sensor accuracy to within ±0.2 knot and to ensure proper operation of pulse generation mechanism.

VJB

P 148555 TR 513 - 2 NSTIC/08878/66 UNCLASSIFIED
Hydronautics Inc., Laurel, Md., U.S.A. UNLIMITED
COUPLED RESPONSE OF A FLOAT-SUPPORTED AIRCRAFT IN A
SEAWAY 532.582.32
Wong, K.K. NONR 4769(00)
May, 1966 66pp.,7ref. NR212-161

A linear method for analyzing the coupled response of a float supported aircraft in a seaway has been derived. It was then applied to two specific aircraft models using the Neumann spectrum to describe the seaway and existing experimental data to estimate the drag and added mass coefficients. Through a systematic variation of the parameters governing the float system it was possible to see their effects on the response characteristics of the aircraft.

RGF

AERODYNAMICS

P 148955 NYU-AA-66-56 ARL 67-0050 UNCLASSIFIED
New York Univ., Bronx, N.Y., U.S.A. UNLIMITED
FINITE DIFFERENCE SOLUTION OF THE LAMINAR
COMPRESSIBLE BOUNDARY LAYER EQUATIONS IN THE VON MISES 532.526.2
VARIABLES WITH APPLICATIONS AF33(615)2215
Kleinstein G,
March, 1967 94pp24ref.

A finite difference solution of the laminar compressible boundary layer equations in the von Mises variables is presented with applications to slot injection. The explicit scheme employed in the numerical method in conjunction with a set of compatibility conditions at the wall provides an accurate and efficient method of solution for the compressible boundary layer.

P 148652 F.Sci.Rep. ARL 67-0009 UNCLASSIFIED
Princeton Univ., Gas Dynamics Lab. N.J. U.S.A. UNLIMITED
RESEARCH ON HYPERSONIC FLOWS (SEPT.,1963 - SEPT., 1966)
Bogdonoff, S.M. 533.6.011.55
Jan., 1967 58pp.,10ref. 532.526.5
533.6.013.13
AF 33(615)1079

During the three year period, September 1963 to September 1966, the Gas Dynamics Laboratory of Princeton University has been engaged in a series of research programs of basic application to hypersonic flight. These studies were experimentally centered around the Princeton Helium Hypersonic facilities developed under previous ARL support. Research in the four basic areas of interest, lifting surfaces, separated flows, boundary layers, and viscous interactions have been undertaken. Summaries of the researches which have been completed are presented as well as the pertinent results. Studies still in process are outlined and preliminary results presented.

RGF

P 146911 UTIAS TN 96 UNCLASSIFIED
Toronto Univ., Inst.for Aerospace Studies, Canada UNLIMITED
DISTORTION OF A SHOCK WAVE TRAVERSED BY A VORTEX
Filotas, L.T. 533.6.011.72
Jan., 1967 25pp.,6ref. 532.527
532.517.43

A theoretical treatment of the sound field produced upon the interaction of a vortex and a normal shock wave was presented some time ago in UTIA Report No. 61 (H.S. Ribner, 1959). The techniques of this analysis are now used to derive expressions for the shape of the distorted shock front. It is found that outside of the section cut off by the cylindrical acoustic wave emanating from the vortex center, the shock remains essentially straight. The portion within this section has curvature, resulting in a finite displacement of the two straight segments. These theoretical predictions are in qualitative agreement with the features noted by experimental investigators of the same phenomenon. As no other presently published theory yields the shock wave shape, this work demonstrates the generality of the approach used.

RGF

NASA TN D 3935 UNCLASSIFIED
National Aero.& Space Admin., U.S.A. UNLIMITED
MODELS FOR THE ANALYSIS OF CN VIOLET RADIATION BEHIND
SHOCK WAVES IN AIR CONTAMINATED WITH CARBON-BEARING 533.6.011.72
COMPOUNDS 535.61 - 28
Nealy, J.E.
May, 1967 25pp.,15ref.

Techniques for analysing the effects of contamination radiation from the CN violet band system behind normal shock waves are presented. The problem is approached in two ways:- (1) a simple chemical system is set up for a known contaminant; and (2) a computer program which utilises a free-energy minimisation technique is used to evaluate the CN particle concentration for given atom percentages of carbon.

MHC

P 148195 CAL-AD-1689-A-7 N67-14890 UNCLASSIFIED
NASA CR 80966 UNLIMITED
Cornell Aeronautical Lab., Inc., Buffalo, N.Y.,
U.S.A. 533.6.011.72
ATOM FORMATION RATES BEHIND SHOCK WAVES IN HYDROGEN AND 546.11
THE EFFECT OF ADDED OXYGEN (JULY 1965-JULY 1966) 533.6.071.8
Myerson, A.L., Joseph, P.J., Watt, W.S. NASr 109
Nov., 1966 26pp.,18ref.

A direct, isothermal measurement was made of the rate of formation of atomic hydrogen behind shock waves in hydrogen-argon mixtures. This was accomplished by using atomic resonance absorption spectrophotometry in the vacuum ultraviolet. The observations were made in an ultrahigh-purity shock tube. The sensitivity afforded by the technique and the simplicity of the interpretation bespeak a high degree of accuracy for the measurement.

MHC

P 148273 F.S. ARL 66-0232 UNCLASSIFIED
Princeton Univ., Gas Dynamics Lab., N.J., U.S.A. UNLIMITED
RESEARCH ON PROBLEMS OF HIGH SPEED GAS DYNAMICS
(NOV.15, 1965-SEPT.16, 1966) 533.6.011.8
Bogdonoff, S.M. 533.6.011.6
Nov., 1966 17pp.,20ref. AF 33(615)-3328
Includes separated flows and other fundamental fluid mechanical problems all under rarefied conditions and at high Mach numbers. Both experimental and theoretical investigations have been carried out.

RGF

P 148994 ZA 332 AD 257890 UNCLASSIFIED
General Dynamics Corp., Convair Div., San Diego, Calif., U.S.A. UNLIMITED
ON THE MIXING PROBLEM OF AN AXI-SYMMETRIC FREE 533.6.011.8
JET INTO AIR INCLUDING CHEMICAL REACTIONS 533.697.4
Ryhming, I.L. 532.529.3
March, 1961 26pp.,8ref. AF 19(604)5554
Velocity and temperature fields together with specie concentrations are computed for an axially symmetric, supersonic, hot, free jet mixing with quiescent air. Two different cases are considered; frozen and quiescent flow.

RGF

NASA CR 766 UNCLASSIFIED
Astro Research Corp., Santa Barbara, Calif., U.S.A. UNLIMITED
THE FLUTTER OF TOWED RIGID DECELERATORS
MacNeal, R.H. 533.6.013.422
May, 1967 36pp.,3ref. 533.6.013.683
The flutter of a rigid drag body towed behind a massive primary body by means of a flexible cable is examined. Nyquist's criterion is used to show that, in order to prevent flutter for all cable lengths, the real part of the mechanical input impedance to the drag body at the cable attachment point must be positive at all frequencies. This result is used to derive relationships between geometric and aerodynamic parameters that define the boundary for unconditional stability (stability at all cable lengths).

RGF

NASA TN D 3966 UNCLASSIFIED
National Aero.& Space Admin., U.S.A. UNLIMITED
THE INFLUENCE OF RESPONSE FEEDBACK LOOPS ON THE
LATERAL-DIRECTIONAL DYNAMICS OF A VARIABLE-STABILITY 533.6.013.47
TRANSPORT AIRCRAFT 629.7.017.27
Szalai, K.J. 533.6.013.417
May, 1967 45pp.,11ref.
The response feedback system feeds back response variables such as sideslip angle or roll rate as rudder or aileron commands, or both, thus altering the various transfer functions which describe the dynamic characteristics of the aircraft.

RGF

P 146910 UTIAS TN 101 UNCLASSIFIED
Toronto Univ., Inst.for Aerospace Studies, Canada UNLIMITED
A COMPUTER STUDY OF A WING IN A SLIPSTREAM 533.6.048.3
Ellis, N.D. 533.6.01
Feb., 1967 19pp.,6ref. 681.3.06 FORTRAN IV

A Fortran IV program for the IBM 7094-II-digital computer has been formulated based on a theory of wing-slipstream interference by Ribner which accounts for the slip-stream effects by means of vortex sheath. This sheath together with the wing vorticity give a pair of simultaneous integral equations for the unknown circulations. A stepwise approximation to the circulations reduces the pair to a system of linear algebraic equations. The format has been modified from that of the earlier work to facilitate inversion of the equations by computer. This first program has been restricted for simplicity to the case of a slipstream centered on a rectangular wing. The printout yields circulation, span loading, integrated lift and other properties. The results show a progression from approximately 'slender body theory' for very narrow slipstreams to 'strip theory' for very broad slipstreams and compare well with experimental data. RGF

P 146651 PIBAL Rep.991 ARL 66-0161 UNCLASSIFIED
Brooklyn Polytechnic Inst.New York, U.S.A. UNLIMITED
A REVIEW OF WORK PERFORMED AT THE POLYTECHNIC
INSTITUTE OF BROOKLYN, AEROSPACE LABORATORIES UNDER 533.6.071.1
CONTRACT 533.697.5
Cresci, R.J. 533.697.3
Aug., 1966 104pp.,20ref. AF 33(657)8286

Deals with the development of a high pressure, high temperature, wind tunnel facility. Several associated problem areas such as the boundary layer behavior in curved passages, cascade tests, surface cooling, nozzle design, and ejector performance were also investigated. The single stage machine resulting from this study can be used as a pilot model and will not provide the very high enthalpy, high pressure flow capability of the ultimate multistage machine.

RGF

AD 645883 Rep. 738 USAAVLABS TR 66-73 UNCLASSIFIED
Princeton Univ., Aerospace & Mechanical Sciences Dept., UNLIMITED
N.J., U.S.A.
GENERAL DESCRIPTION OF THE PRINCETON DYNAMIC MODEL TRACK 533.6.072
Curtiss, H.C., Putman, W.F., et al. 533.68
Nov., 1966 22pp.,7ref. DA 44-177-AMC-8(T)

The Princeton Dynamic Model Track is used primarily for making direct measurements of the time histories of the motion of dynamically similar models in response to control inputs and other disturbances. In these experiments, the carriage movement is commanded by the motion of the model through positioning servomechanisms. The response of a suitably scaled model may then be directly interpreted in terms of full-scale aircraft characteristics, and analyzed for the stability derivatives of the vehicle.

VJB

NASA CR 761 UNCLASSIFIED
General Electric Co., Cincinnati, Ohio, U.S.A. UNLIMITED
LIFT FAN TECHNOLOGY STUDIES
Przedpelski, Z.J. 533.662.3
April, 1967 299pp.,17ref.

All of the thermodynamic, aerodynamic, and system studies results are reported in their entirety in this part of the research report. The summaries of the mechanical studies and of the preliminary designs are also included in this part, while the details are reported in Part II of the research report.

RGF

P 148857 USAAVLABS TR 67-20 UNCLASSIFIED
Aerophysics Co., Washington, D.C., U.S.A. UNLIMITED
AERODYNAMIC TESTING OF AN AIRBORNE LIGHTWEIGHT HIGH-EFFICIENCY RADIAL FAN 533.662.3
Fosteg, W., Ray, H., et al. 533.697.3
March, 1967 38pp.,6ref. DA44-177- AMC454 (T)

The results of the aerodynamic testing of a 66-inch diameter rotating-diffuser centrifugal fan for internal flow airborne applications are presented. To accommodate the testing of this unit, a testing facility had to be designed and built. Because of the availability of a test pad and high-power variable frequency electric motor equipment, the facility was located on the grounds of the Aerodynamics Laboratory of the U.S. Navy David Taylor Model Basin. The test stand and its calibration are described, and the results are presented. Results of the tests indicate a peak total pressure efficiency of 85%. This correlates with model fan information, including an experimentally determined scale effect.

RGF

P 149049 FR AFFDL TR 66-230 UNCLASSIFIED
Ling-Temco-Vought Inc, Aeronautics Divs., Dallas, Tex., U.S.A. UNLIMITED
INVESTIGATION OF ABLATION EFFECTS ON HYPERSONIC DYNAMIC STABILITY OF A 10deg. CONE (JUNE, 1965 - NOV., 1966) 533.665 Re-Entry 533.696.4
Moore, D.R., Stalmach, C.J.
Jan., 1967 84pp.,10ref.

An experimental program has been conducted in the LTV Hypervelocity Wind Tunnel at M = 17 to investigate the effects of ablation product characteristics and thermal lags on re-entry vehicle dynamic stability. The free oscillation method of dynamic stability measurement was used and the ablation processes were simulated by the controlled mass injection through four sections of the porous model skin.

RGF

NASA TN D 3960 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
WIND-TUNNEL TESTS OF A SERIES OF PARACHUTES DESIGNED FOR CONTROLLABLE GLIDING FLIGHT 629.734.7
Weiberg, J.A., Mort, K.W. 533.665.2
May, 1967 39pp.,2ref. 533.6.013.682

It was found that the glide capability of parachutes was affected by the canopy configuration. The maximum lift-drag ratio achieved was approximately 2.1 and was attained by two parachutes, a rectangular canopy and a 3-lobe canopy. This performance was generally obtained with some loss in stability, particularly at low lift drag ratios corresponding to nearly vertical descent. Limited results of an investigation of two reefed configurations are also presented.

RGF

P 146987 UTIAS TN 100 UNCLASSIFIED
Toronto Univ., Inst.for Aerospace Studies, Canada UNLIMITED
EFFECT OF GROUND BOARD BOUNDARY LAYER ON AIR CUSHION VEHICLE WIND TUNNEL TESTS 533.682
Garay, E.K. 532.526
Jan., 1967 18pp.,18ref.

Forward speed tests were performed on an Air Cushion Vehicle in the UTIAS subsonic wind tunnel using a fixed ground board. The effect of the ground board boundary layer on the reactions of the vehicle was determined by comparing the test results with previous tethered flight tests conducted in the UTIAS circular track facility. Comparisons with similar reported tests were made to extend these test results. Results did not indicate any noticeable differences between the wind tunnel and circular track results. Analysis showed that differences begin to appear as the forward speed increases and curves the leading edge jet backwards. The magnitude of the boundary layer effect on the vehicle reactions is shown to depend on the testing technique used. The suitability of low priced model aircraft engines for low budget powered model testing is demonstrated.

RGF

CoA Rep.Aero 196 UNCLASSIFIED
College of Aeronautics, Cranfield, U.K. UNLIMITED
STABILITY OF GROUND EFFECT WINGS
Kumar, P.E. 533.682
May, 1967 21pp.,22ref. 533.6.013.417
This report states some of the problems encountered in the stability and control of a ground effect wing and attempts at obtaining some feel for the longitudinal and lateral stability derivatives. An outline of possible future theoretical work is given, as are also some preliminary quasi-steady wind-tunnel results.

RGF

P 148428 Res.Rep.229 UNCLASSIFIED
Army Cold Regions Res.& Engineering Lab., Hanover, NH., U.S.A. UNLIMITED
FORCES ON A SPHERE MOVING STEADILY ALONG A CIRCULAR PATH IN A VISCOUS FLUID 533.696.2
533.6.011.12
Odar, F. 532.582.81
April, 1967 10pp.,2ref.
Forces on a sphere moving steadily along a circular path in a viscous fluid are measured and it is found that within the experimental range both the longitudinal and normal forces are dependent on the Reynolds number and not on the radius of the path. Thus, the conventional drag coefficient can also be obtained from a rotational motion.

RGF

NASA CR 737 UNCLASSIFIED
Lockheed Missiles & Space Co., Huntsville, Ala., U.S.A. UNLIMITED
AERODYNAMIC CHARACTERISTICS FOR CONE-CYLINDER-FRUSTUM-CYLINDER CONFIGURATIONS AT MACH NUMBERS FROM 0.7 TO 1.96. 533.696.43
VOLUME I: LINEAR LOAD DISTRIBUTIONS 533.6.048.2
Thompson, J.F. 533.6.048.1
April, 1967 144pp.,6ref.
The data from an extensive wind tunnel pressure distribution test programme were analyzed to provide linear aerodynamic load distributions in the high subsonic, transonic and low supersonic Mach number regimes for cone-cylinder-frustum-cylinder configurations.

RGF

P 148241 NRL Rep.6493 UNCLASSIFIED
Naval Res.Lab., Washington, D.C., U.S.A. UNLIMITED
THEORY ON OPTIMUM PERFORMANCE OF MODERN JET EJECTORS
Lee, R.S.L., Balwanz, W.W. 533.697.5
12.4.1967 20pp.,11ref. 533.6.011.8
A theoretical investigation was made of the optimum performance of a single-stage jet ejector with allowances made for the differences in temperature and molecular weight of the motive gas and the suction gas. The analysis considers the case in which supersonic flow and hence normal shock occurs in the injector and the case of flow without normal shock.

RGF

PLASMA PHYSICS

P 148694 FR AFCRL 67-0181 UNCLASSIFIED
Illinois Univ., Electrical Engineering Dept., UNLIMITED
Urbana, U.S.A.
INVESTIGATIONS OF OXYGEN PLASMAS 533.9
(1.11.1963 - 31.1.1967) 546.21
Pfister, W. AF19(628)-2391
31.1.1967 45pp., 56ref.

This laboratory has undertaken "Investigation of Oxygen Plasmas," in agreement with the Geophysics Research Directorate, Air Force Cambridge Research Centre, under Contract AF 19(628)-2391. This report reviews the original purposes for these investigations and the work done.

FAM

P 148246 FR AFCRL 66-672 UNCLASSIFIED
Toronto Univ., Inst. for Aerospace Studies, UNLIMITED
Ontario, Canada.
SIMULATION REQUIREMENTS FOR ROCKET-BORN ION 533.9.08
SAMPLING PROBES (1 MAY 1965 - 30 APRIL 1966) 551.507.362.1
Delsemme, J.H. AF 19(628)-5134
12.9.1966 12pp., 5ref.

The requirements for laboratory model simulation of a rocket-borne ion-sampling probe are reviewed. Some successful experiments were performed to attain the proper value of the ratio of Debye length to model size. However, in the plasma flows produced so far, the ratio of electron temperature to gas temperature was found to be much higher than that relevant to ionospheric conditions.

VJB

P 148650 Sci.Intm.Rep. ARL 67-0020 UNCLASSIFIED
RCA Victor Co.Ltd., Montreal, Canada UNLIMITED
DIAGNOSTICS OF MAGNETOPLASMAS BY LARGE
ANGLE LASER SCATTERING 533.9.082.5
Shkarofsky I.P. 533.95((538.4))
Jan., 1967 108pp., 13ref. 621.375.826
AF33(615)-2196

A review of experiments until 1967 on laser scattering from plasmas is given which indicates that any static magnetic field if present has not been utilized for diagnostics. The Appendix summarises the theory on scattering of electromagnetic waves from an infinite magnetoplasma with arbitrary velocity distributions for electrons and ions. The equations are then simplified to apply to electrostatic fluctuations.

RGF

NASA TN D 3838 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
COMPARISON OF GRYZINSKI AND BORN CROSS SECTIONS
FOR THE METASTABLE 2s STATE OF ATOMIC HYDROGEN 533.92
Monnin, C.R., Prok, G.M. 546.11-12
April, 1967 32pp., 22ref.

Excitation and ionization cross sections for electron scattering in metastable atomic hydrogen were calculated by the Born approximation and by the semiclassical theory of Gryzinski. The transitions investigated were excitations from the 2s level to n = 3,4 and ionization. The energy range of the incident electron was from the threshold to 400 electron volts. In the Gryzinski theory the atomic electrons may be assumed to have a distribution of velocities or a single, average velocity. In this report, excitation cross sections calculated with the use of both assumptions are compared with the results of the Born approximation. The cross section resulting from the velocity distribution agreed better with the Born approximation than with the cross section resulting from the average value of the velocity. Since no experimental results are available, the Born approximation above 200 electron volts is assumed correct. The shapes of the Gryzinski-cross-section curves are similar to those for the Born approximation over the energy range investigated.

FAM

P 148944 DLR FB 67-37 DVL Ber. 648 UNCLASSIFIED
Deutsche Versuchsanstalt für Luft-und UNLIMITED
Raumfahrt, Germany
ENERGY, ELECTRICAL CONDUCTIVITY AND DIELECTRIC 533.922:
CONSTANTS OF CHARGED PARTICLES IN ELECTRIC AND 538.4
MAGNETIC FIELDS (ENERGIEAUFNAHME, ELEKTRISCHE
LEITFÄHIGKEIT UND DIELEKTRIZITÄTSKONSTANTE VON
GELADENEN TEILCHEN IN ELEKTRISCHEN UNF
MAGNETISCHEN FELDERN) (Report in German)
Kelm, S.
June, 1967 45pp.,13ref.

The maximum proportion of available electrical energy should be converted into the thermal energy of plasmas used as sources for electrodeless mhd generators. A knowledge of the energy gained by charged particles between collision is important for calculating the amount of energy converted. A method of determining this gain of energy is stated. The electrical conductivity was calculated from the particle drift and the dielectric constant from the conductivity by simple formulae.

P 148559 F Sci. Rep. AFCRL 66-527 UNCLASSIFIED
Observatoire de Paris, France UNLIMITED
RESEARCH ON THEORY OF MAGNETOGASDYNAMICS
Denisse, J.F. 533.95((538.4))
15.12.1965 95pp.,15ref. AF 61(052) 432

Contents:- I - Study of waves in plasma submitted to a general adiabatic condition with no restriction on the pressure tensor. II - Critical study of the linear approximation of the Vlasov equation and of the Landau damping. III - Study of the Cerenkov radiation of a charge moving in a plasma, including frequency and angular spectra.

RGF

P 146908 UTIAS TN 103 UNCLASSIFIED
Toronto Univ., Inst. for Aerospace Studies, Canada, UNLIMITED
DENSITY DISTRIBUTION OF A MOLECULAR FLUX FROM
A SHORT CYLINDRICAL TUBE 533.95(538.4))
Leout, J.H., Gadmer, E.O. 533.6.011.8
Feb., 1967 50pp., 11ref.

The radial density distribution of the molecular flux emerging from a short cylindrical tube, which connects two low-density gas chambers, is calculated both in the exit plane of the tube and just downstream of that plane. The calculations are based on the kinetic theory of gases. It is assumed that the upstream density is low enough so that free-molecule conditions prevail at the tube inlet, and that the distribution function in the upstream chamber is a Maxwellian with zero average velocity. The molecules emerge into a near-vacuum which is maintained in the downstream chamber. It is assumed, furthermore, that all reflections of molecules from the tube wall are of the diffuse type, that is, the momentum and thermal accommodation of the molecules leaving the wall are complete. This wall may in general be at a temperature different from the upstream gas temperature, but in the present calculations both these temperatures are assumed to be the same. Computations have been made for the tube length-to-diameter ratios 0.25, 0.50, 0.75, and 1.00, using the IBM 7040 electronic digital computer facility at McMaster University. The study was undertaken primarily to provide theoretical results complementing an experimental investigation, /continued

P 146908 (continued)

carried out at the Institute for Aerospace Studies, of the density distribution in a low-density air jet emerging from a cylindrical tube of length-to-diameter ratio 1.00. In these experiments, the gaseous fluorescence induced by a thin electron beam projected across the gas jet was utilized. Satisfactory agreement between experimental and calculated results was found.

RGF

TIL/OT/8472 AERE TRANSL. UNCLASSIFIED
LB/0/2451 UNLIMITED
Royal Aircraft Est., Ministry of Technology, U.K.
MEASUREMENTS OF ELECTRON TEMPERATURE IN /N 533.951.2
ARGON - POTASSIUM PLASMA (Transl. from: Inst.
Plasma Physik, Rep., (3/31), 1965, Germany)
Riedmuller, W.
Sept., 1966 60pp., 12ref.

When an electric current is passed through a rare-gas/alkali plasma the electron temperature is expected to rise above the gas temperature. This effect was investigated in a streaming argon-potassium plasma at atmospheric pressure and a gas temperature of 2000 deg.K. The electron temperature was measured as a function of the current density by means of the line reversal method. The results were compared with the values calculated from the theory and also with the values calculated from the measured conductivities. For temperatures above 2400 deg.K all three methods give the same results.

VJB

TIL/OT/8525 CLM-Trans 8 UNCLASSIFIED
Culham Lab., U.K. Atomic Energy Authority. UNLIMITED
DYNAMICS OF THE PLASMA ENVELOPE OF A NON- 533.952
CYLINDRICAL Z-PINCH UP TO THE INSTANT OF
IMPLOSION (Transl. from: Report 18/904,
I.V.Kurchatov Institute, Moscow, 1966)
Kolesnikov, Yu.A., Filippov, N.V., et al
Dec., 1966 10pp., 7ref.

Investigations of pulsed discharges show that the parameters of the plasma obtained by the implosion (pinching) of the current depend significantly on the initial stage of the formation of the plasma sheet, its structure and the dynamics of its motion. Experimental investigations are made in a pinch chamber with metallic walls.

VJB

ACOUSTICS & VIBRATIONS

P 148648 BULL 36 PT.6 UNCLASSIFIED
Office Of The Director Of Defence Res. & UNLIMITED
Engineering, Washington, D.C., U.S.A.
THE 36th SYMPOSIUM ON SHOCK AND VIBRATION 061.3 "10.1966"
(18-20th OCTOBER, 1966) 534.1
Feb., 1967 24pp. 620.178.311.5

Contents: Effect of digitising detail on shock and Fourier spectrum computation of field data (Gertel, M., Holland, R.); Automated digital shock data reduction system (Murfin, W.B.); Automated analog method of shock analysis (Prendergast, F.X.); Vibration data reduction techniques as applied to Saturn S-II vehicle (Weatherstone, J.D.); Use of a low-frequency spectrum analyzer (Lee, S.E., Tuckerman, R.G.); Detection of loose parts and free objects in sealed containers (Schultz, M.H.); Combined environment testing of shipboard electronic equipment and utilization of regression analysis (Robinson, F.); Analysis of random vibration with aid of optical systems (Ching-u Ip); Computer program for dynamic design analysis method (Avila, J.H.); Computer program for general ship vibration calculations (Henderson, F.M.); Mathematical model and computer program for transient shock analysis (Melodia, A.C.); Transportation environmental measurement and recording system (Holley, F.J.); Development of velocity shock recorder

(continued)

P 148648 (continued)

for measurement of shipping environments (Venetos, M.A.); Absolute calibration of vibration generators with time-sharing computer as integral part of system (Payne, B.F.); Experimental techniques for observing motion of extendible antenna booms (Hershfeld, D.J.); Development of low-cost force transducer (Gterk, M.W., Ellison, J.A.); Automatic calibration and environmental measurement system for launch phase simulator (Cyphers, H.D., Holley, F.J.); Microminiature instrumentation amplifiers (Bratkowski, W.V., Pittman, P.F.); Investigation of pulse X-ray techniques for study of shock-wave-induced effects in soil (Baker, W.J., Jansa, F.J., et al.).

VJB

P 148649 BULL. 36 PT 7 UNCLASSIFIED
Office Of The Director of Defense Res. & Engineering, Washington, D.C., U.S.A. UNLIMITED
THE 36th SYMPOSIUM ON SHOCK AND VIBRATION (18-20th OCTOBER 1966) 061.3"10.1966"
534.1
Feb., 1967 156pp. 620.178.311.5

Contents: Estimate of effect of spacecraft vibration qualification testing on reliability (Stahle, C.V.); S-IC reliability program from structural life viewpoint (Rich, R.L., Roberts, J.A.); Structural reliability - panel session; Dynamic analysis of ATS-B spacecraft (Kaplan, S.M., Terkun, V.); Spacecraft design for Atlas torsional shock transient (Davis, S., Hiller, F.); Comparison of predicted and measured launch loads for Snap 10A (Robb, E.A., Gelman, A.P.); Ground-wind-induced oscillators of Gemini-Titan air vehicle and its erector (Tomassoni, J.E., Lambert, W.H.); Noise level measurements for improved Delta, Atlas/Agena-D, and Tat/Agena-D launch vehicles (Williams, L.A., Tereniak, W.B.); The "Vacuum Spring" (Robertson, K.D.); Self-adaptive vibration balancing device for helicopters (Hooper, W.E.); Shock response of electronic equipment cabinets by normal mode method (Hasselman, T.K., Hwang, C.M.); Damped vibration of elastically supported rigid body with coupling between translation and rotation (Collopy, F.H.); Missile handling analysis (Brown, C.R., Avis, A.J.).

VJB

P 148560 AVSSD 0059-67 RR AFCRL 67-0172 UNCLASSIFIED
AVCO Corp., Space Systems Div., Wilmington, Mass., U.S.A. UNLIMITED
THEORETICAL STUDY OF THE PROPAGATION OF INFRASONIC WAVES IN THE ATMOSPHERE (JAN., 1964 - F.B., 1967.) 551.556.6
534.222.2
AF 19(628)3891
Pierce, A.D., Moo, C.A.
Feb., 1967 72pp., 219ref.

A simple demonstration of the theoretical basis of amplitude-yield proportionality is given and work on the extension of the normal mode method to include non-stratified windy atmospheres is described. The formulation for incorporating wind effects into theoretical models is reviewed. A justification of the multilayer method is given and numerical results based on this approximation are summarized. The report includes a listing of all reports, journal articles, and symposia papers written under the contract and includes an extensive bibliography on atmospheric waves and nuclear explosions. Recommendations for future research are given.

P 148422 NRL Rep.6533 UNCLASSIFIED
Naval Res.Lab., Washington, D.C., U.S.A. UNLIMITED
MONOSTATIC ACOUSTIC SCATTERING FROM OCEAN VOLUME 621.391.812.624
534.808
Hurdle, B.G., Flowers, K.D. 534.321.9
28.3.1967 16pp., 4ref. U 1065:1063

A monostatic volume-scattering experiment was conducted in the Atlantic with a piston transducer operated at 19.5 kHz and having a beam width of approximately 8 deg. at the half-power points. This investigation was made to determine the correspondence between measured returns and a model based on the theory of isotropic scattering from a volume. Intensities from measured values were averaged and volume-scattering strength computed as a function of depth for several depression angles and for a range of pulse lengths. Scattering strength was found to be independent of the ensonified volume in regions of uniform scattering strength. Scattering strength profiles measured in two areas of the Atlantic display a decrease of scattering strength of approximately three orders of magnitude from near the surface to a depth of 1000 fathoms.

DMA

P 148423 NRL Rep.6517 UNCLASSIFIED
Naval Res.Lab., Washington, D.C., U.S.A. UNLIMITED
EFFECT OF GEOMETRY ON ACOUSTIC MONOSTATIC SCATTERING FROM THE OCEAN BOTTOM 621.391.812.624
534.88
Hurdle, B.G., Flowers, K.D. 534.321.9
16.3.1967 30pp., 10ref. U 1065:1063

An investigation was made to determine the degree of correspondence between measured returns scattered from the ocean bottom and an extended model of isotropic scattering from a boundary. The isotropic scattering model was applied to yield the form of the scattered intensity as a function of time for the monostatic geometry in which a circular symmetric beam function is employed. An experiment was conducted in the Blake Plateau area with a piston transducer operated at 19.5 kHz and having a beamwidth of approximately 8 degrees at the half-power points. Measured signal intensities from the relatively flat bottom in this area were averaged and compared with those of the model. However, for a given depression angle it is found that scattering strength, the acoustic constant used to characterize the boundary, varies with pulse length. This indicates that scattering from the Blake Plateau bottom is not isotropic. Measurements of scattering strength versus grazing angle for the Blake Plateau area were obtained.

DMA

OPTICS & INFRA-RED SYSTEMS

P 148345 OTP No.B-216 AFCRL-66-847 UNCLASSIFIED
Sci. Rep.1. UNLIMITED
Georgia Inst. of Tech.,Atlanta,U.S.A.
CALIBRATION AND DATA REDUCTION OF AN 535.243
UV SPECTROPHOTOPOLARIMETER 535.244
Hodgdon, E.B. 681.3.06
Oct., 1966 136pp.,10ref. AF 19(628)-5707

Describes and proves by sample data the procedures for calibration of and data reduction from an ultraviolet spectrophotopolarimeter. The objective of the instrument is to measure the intensity and polarization of skylight radiation at altitudes of greater than 100,000 feet. A brief description is given of the instrumentation package and, in particular, the portions directly involved in the calibration procedure. The body of the report contains the procedures used in optical calibration and the general and specific problems in data reduction. Samples of data have been processed through the data reduction programme and the programmes have been shown to work. However, overall accuracy and probable error have not been carefully evaluated. Three appendices are included which give details of (1) Stokes Vectors and Mueller Calculus, (2) Derivation of the Calibration Formulae, and (3) Computer Programs.

FAM

NASA CR 78430 N66-38114 UNCLASSIFIED
General Dynamics,Convair Div.,San Diego, UNLIMITED
Calif.,U.S.A.
PREDICTION OF TOTAL EMISSIVITY OF NITROGEN- 546.212-13
BROADENED AND SELF-BROADENED HOT WATER 546.17
VAPOR 535.333
Ludwig, C.B., Farrise, C.C. NAS 8-11363
Feb., 1966 47pp.,12ref.

Predictions of the total emissivity of nitrogen-broadened and self-broadened water vapour in the temperature range from 600 to 3000 deg.K and optical depths from 0.1 to 10,000 cm atm are made, based on a set of spectral absorption coefficients, fine structure parameters which are temperature-dependent but frequency-independent, and the assumption that the curve of growth is given by a statistical band model.

MRC

P 148577 TR 42 FR UNCLASSIFIED
AFCRL 67-0156 UNLIMITED
Warner & Swasey Co.,Flushing,N.Y.,U.S.A.
STRENGTHS OF LINES IN THE V_1 AND V_3 INFRARED 535.342-15
BANDS OF H_2O (18.1.1965 - 17.1.1967) 546.212
Babrov, E.J. AF 19(628)4989
17.2.1967 53pp.,7ref.

The strengths of twelve lines in the V_1 band and thirty lines in the V_3 band of H_2O were measured by a curve-of-growth method. The experimental strengths of these infrared lines were compared to strengths calculated from the asymmetric rigid rotator model of the H_2O molecule. In general, the ratio of experimental strength to rigid rotator strength, varied from less than unity in the R-branch to greater than unity in the P-branch with intermediate values in the Q-branches for both bands, V_1 and V_3. This variation was larger in the V_1 band by a factor of about 3. Superposed on the gradual variation in the ratio, experimental strength/rigid rotator strength, were erratic changes, in an extreme case resulting in a ratio of 257, due to accidental perturbations in the wave functions involved in these transitions.

FAM

D 644370 UNCLASSIFIED
Southern Calif. Univ.,Los Angeles,Calif.,U.S.A. UNLIMITED
FIRST INTERNATIONAL CONFERENCE ON VACUUM
ULTRAVIOLET RADIATION PHYSICS: PROGRAM AND 535.342-31
ABSTRACTS OF PAPERS APRIL 16th - 19th 1962 061.394.1962"
1962 97pp.

Topics included are: Atomic and molecular spectra; Photon-gas cross sections; Radiation research on hot gaseous plasmas; Space spectroscopy; Radiation in solid state problems; Instrumentation and techniques; Vacuum U.V. radiation physics in the U.S.S.R.

FAM

P 148348 TO-B-67-9 FR AFCRL-67-0117 UNCLASSIFIED
Technical Operations Inc.,Burlington,Mass.,U.S.A. UNLIMITED
INVESTIGATION OF ELECTRONIC FRINGE DETECTOR FOR A
STELLAR INTERFEROMETER 535.411
Boardman, J., Kellen, P. 523.8
7.2.1967 39pp.,24ref. AF 19(628)-5145

A fringe detector was constructed to detect fringes from a Michelson stellar interferometer and to relate these measurements to the characteristics of the source of illumination. A rotating reflector, a single slit, and a phototube were combined to transform the spatially-varying intensity pattern of the fringe field into a time-varying voltage signal displayed on an oscilloscope face. The oscilloscope trace was photographed and analyzed to determine fringe contrast.

PBP

P 148349 Sci. Rep.2 AFCRL-67-0089 UNCLASSIFIED
California Univ.,Meteorology Dept.,Los Angeles, UNLIMITED
Calif.,U.S.A.
INVESTIGATIONS OF THE POLARIZATION OF LIGHT 551.593.7
REFLECTED BY NATURAL SURFACES 535.51
Chen, H-G., Rao, C.R.N., et al 535.312
Jan., 1967 96pp.,14ref. AF 19(628)-3850

The polarization features of light reflected by soil, desert sand, white sand and water under different conditions of illumination with natural (unpolarized) and polarized light have been investigated in three narrow spectral intervals (band width~150 A) centred on λλ3975, 5000 and 6050A. A simple 'rotating-analyser' type photoelectric reflectometer was used in the measurements. The data were acquired in computer compatible format to facilitate Fourier analysis of the photosignal. The degree of polarization and relative intensity variations have been determined from a knowledge of the Fourier coefficients.

VJB

P 148558 Sci.Rep.1 AFCRL 67-0138 UNCLASSIFIED
Israel Atomic Energy Commission,Soreq Res.Est. UNLIMITED
PHOTOCONDUCTIVITY OF UV EXCITED DIAMONDS
Halperin, A., Levinson, J. 537.312.5
July, 1964 12pp.,7ref. 535.61-31
549.211
AF 61(052)759

Spectral response curves for the photoconductivity of UV excited diamonds are given. Diamonds excited at 77 deg.K are shown to respond to infrared up to at least 2μ, with maxima in the response curves at 0.6, 0.8 and 1.3μ. The behaviour of the 0.6 and 0.8μ bands on warming the crystal and on irradiation with light within the bands is given.

PBP

HEAT, THERMODYNAMICS, COMBUSTION

P 148952 R.R. 212 UNCLASSIFIED
Army Cold Regions Res. & Engineering Lab., UNLIMITED
Hanover,N.H.,U.S.A.
HEAT CONDUCTION IN MOIST POROUS MEDIA 536.2
Yen, Yin-Chao
Dec.,1966 10pp.,3ref.

An equation has been developed to describe heat conduction in moist porous media. Specific examples are given to demonstrate the effect of dry medium density and water vapour diffusivity through the medium on the rate of temperature propagation in snow.

JEP

TIL/OT/8635 AERE TRANSL LB/O/2491 UNCLASSIFIED UNLIMITED

Atomic Energy Res. Est., Harwell, U.K.

THERMAL FIELDS AND HEAT FLUXES. 536.24

PART I. GRAPHICAL STUDY OF STEADY AND VARIABLE CONDITIONS. CHAPTER III. GRAPHICAL METHODS FOR VARIABLE CONDITIONS. 1. LINEAR THERMAL FIELD AND UNIDIRECTIONAL HEAT FLOW THROUGH A WALL (Transl. from: Bulletins techniques de la Societe Francaise des Constructions. Babcock et Wilcox 1950, (23), 73-119, France)

Nov., 1966 79pp., 54fig.

In this study heat flow through flat, cylindrical and spherical walls having free isothermal surfaces where the flow is in one dimension is first considered followed by the consideration of walls having any section or form or having nonisothermal boundary surfaces, where the flow is in two or three dimensions.

JEP

NASA TN D 3943 TECHNICAL FILM SUPPLEMENT C-252 UNCLASSIFIED UNLIMITED

National Aero. & Space Admin., U.S.A.

ASSESSMENT OF CONVECTION, CONDUCTION, AND EVAPORATION IN NUCLEATE BOILING 536.423.1

Graham, R.W., Hendricks, R.C. 536.2

May, 1967 42pp., 4ref. 541.182.2

Various heat-transfer mechanisms including convection, transient conduction, and evaporation are discussed and evaluated for their contribution to the overall nucleate-boiling heat flux. Recent boiling experiments that pertain to these mechanisms are cited. From the evaluation, a nucleat-boiling model is proposed that includes elements of each of the heat-transfer mechanisms.

MHC

P 148954 C/L.Rep.AD 672-A-3 ARL 67-0049 UNCLASSIFIED UNLIMITED

Cornell Aeronautical Lab. Inc., Buffalo, N.Y., U.S.A.

CONDENSATION DROPLET GROWTH IN RAREFIED GASES 536.423.4

532.694

Kang, Sang-Wook 533.5

March, 1967 32pp., 12ref. AF 33(657)8302

An analysis is made of thermal and diffusion effects on droplet growth phenomena in a supersaturated vapour and inert carrier gas. Two cases are considered: (1) constant fluid conditions, and (2) changing fluid conditions due to condensation effects. The analysis is so formulated as to describe the continuous growth process as the droplet size increases from microscopic (free-molecular to "rarefied", even to macroscopic (continuum). Equations for the conservation of mass and energy are derived by application of the "Langmuir model" in the rarefied ("slip") regime and two correlation parameters for the mass transfer and the energy transfer are introduced for analyzing this regime. Analytic solutions are obtained for the droplet growth with time by expressing the saturation vapour pressure as a linear function of temperature.

JEP

RTS 3630 UNCLASSIFIED UNLIMITED

National Lending Library, Russian Translation Programme, U.K.

THE STABILITY OF THE TURBULENT DIFFUSION FLAME IN A G/S JET (Transl. from: Rev. Roum. sci. techn. electrotechn. energ., 1965, 10, (2) 345-359, Roumania) 536.46

Grekov, D., Gutzu, E.

Nov., 1966 16pp., 15ref.

The physical model used and the equilibrium conditions established for the stability of a flame make possible the calculation of theoretical relationships for the velocity of flame lift and blow off, and also for the distance of the break away from the neck of the jet.

P 148603 AECL 2680 CRDP 1254 UNCLASSIFIED
Atomic Energy of Canada Ltd., Chalk River, Ontario UNLIMITED
THE AMPLIFIER-DISCRIMINATOR DESIGNED FOR THE NM - 64 NEUTRON MONITOR 539.1.074.8 546.273'161
Steljes, J.T.
March, 1967 12pp.

The amplifier-discriminator designed for the large boron-trifluoride counters used in the NM-64 monitors is described, together with the testing procedures used by the factory.

FAM

P 148669 TR 32-373 UNCLASSIFIED
California Inst. of Tech., Jet Propulsion Lab., Pasadena, Calif., U.S.A. UNLIMITED
LEAST-SQUARE ANALYSIS OF GAMMA-RAY PULSE HEIGHT SPECTRA 519.281.2 539.122
Trombka, J.I. NAS 7-100
15.12.1962 26pp., 12ref.

In this analysis the pulse height spectrum due to a polyenergetic distribution of gamma rays is synthesized by using a series of normalized pulse height distributions resulting from the monoenergetic components in the incident beam. All of these monoenergetic pulse height distributions are weighted so their sum is a best fit based upon a least-square criterion, to the experimentally determined polyenergetic pulse height distribution. There is difficulty in the application of least-square technique to the analysis of pulse height spectra because the problem is nonlinear in energy. In the technique described here, this difficulty has been overcome by using linear methods of solution, but applying the constraint that only positive or zero values be allowed for the intensities or amplitudes of the various monoenergetic components.

VJB

NASA TN D 3909 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
PROTON BOMBARDMENT OF HIGH PURITY SINGLE-CRYSTAL SILICON 539.125.4.04
Robertson, J.B., Franks, R.K., et al. 546.28
May, 1967 24pp., 32ref.

Bombardment of high-purity silicon with 22-MeV protons has produced Al^{27} at a rate of 6×10^{-3} atom per proton in a thick target. The aluminium was identified by the Al_2 infrared absorption spectrum. The production of aluminium in the crystals eliminated the study of damage in impurity-free silicon but, in return, provided for a study of defect interactions with aluminium. The production rate of aluminium is high enough that anyone studying radiation damage by protons should be aware of the presence of the aluminium.

PBP

NASA TN D-4000 UNCLASSIFIED
National Aero & Space Admin., U.S.A. UNLIMITED
GENERALIZED POTENTIALS FOR INELASTIC SCATTERING
Volkin, H.C. 539.171
May, 1967 51pp., 15ref.

The generalized potential that gives the scattering into a selected group of inelastic channels along with the elastic scattering is derived by means of the projection operator for the set of channels. A general class of projection operators that selects all open channels is developed in terms of the previous projection operator. The resonance part of the generalized potential can then be obtained by means of Feshbach's unified theory of nuclear reactions. There is no limitation on the types of reactions that can occur. Examples of projectors belonging to the class are given for the case of two-channel reactions. An example which is discussed in some detail is the pickup process. After the resonance contributions have been isolated, the transition amplitudes can be energy averaged. The result is used to obtain the generalized optical potential. The properties of the potentials that follow from the equations which determine them are discussed. A short review is given of some elements of Feshbach's reaction theory that are required.

FAM

AD 616733 AFWL-TR-65-3 UNCLASSIFIED
Air Force Weapons Lab., Kirtland AFB, N.Mex., U.S.A. UNLIMITED
PROTON ABSORPTION IN DOSE-EQUATED 539.171.112
MATERIALS (1.9.-1.12.1964)
Janni, J.F.
April, 1965 181pp., 13ref.

Presents theoretically calculated values of the ionization interaction for protons in numerous materials and compares these values with those of tissue and bone. This has been done so that possible dosimetric media may be compared and evaluated for "dose equivalency". Results for the linear energy transfer have also been included. The proton energies are considered from 0.5 Mev to 1000 Mev. The K and L shell effects upon the stopping power equation have been included. The calculation approach and the resultant tabulations are presented in detail for over seventy different materials.

FAM

NASA TN D 3991 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
ELASTIC AND INELASTIC SCATTERING OF 42-MeV
ALPHA PARTICLES FROM EVEN TELLURIUM ISOTOPES 539.171.6
Leonard, R.F., Stewart, W.M., et al 546.24.02
May, 1967 25pp., 13ref.

Angular distributions were measured for alpha elastic and inelastic scattering with isotopically enriched targets of tellurium 122, 124, 126 and 130 by using the 42-MeV alpha beam of the NASA 60-inch cyclotron. In each isotope, three excited states exhibited relatively large cross sections. These were the one-phonon quadrupole state, the two-phonon state with spin and parity 4^+, and the one-phonon octupole state. Several other states were excited in each isotope but with cross sections that were too small to allow determination of very reliable excitation energies or differential cross sections. The elastic angular distributions were analyzed by using the optical model with a four parameter Woods-Saxon potential and the Blair sharp cutoff model. Optical model fits have been obtained for a wide range of values of optical model parameters. All potentials that give a satisfactory fit to the experimental data are nearly identical at their outer edges, although they vary widely in the interior of the nucleus.

FAM

P 148346 Sci.Rep.1 AFCRL-67-0104 UNCLASSIFIED
MITNE-80 UNLIMITED
Massachusetts Inst. of Tech., Cambridge, U.S.A.
STUDY OF THERMAL NEUTRON CAPTURE GAMMA RAYS 539.172.4
USING A LITHIUM DRIFTED GERMANIUM SPECTROMETER 539.122.164
Orphan, V.J., Rasmussen, N.C. AF 19(628)-5551
Jan., 1967 193pp., 74ref.

A gamma-ray spectrometer, using a 30 cc coaxial Ge(Li) detector, which can be operated as a pair spectrometer at high energies and in the Compton suppression mode at low energies provides an effective means of obtaining thermal neutron capture gamma spectra over nearly the entire capture gamma energy range. The energy resolution (fwhm) of the spectrometer is approximately 0.5% at 1 MeV and 0.1% at 7 MeV. Capture gamma-ray energies can be determined to an accuracy of about 1 keV. The relatively high efficiency of this spectrometer allows the use of an external neutron beam geometry, which simplifies sample changing. Using a 4096 channel pulse height analyzer, the capture gamma spectrum of an element may be obtained in about one day. Low cross section (order of 0.1 b) elements with many weak intensity gammas may be studied. Over 100 gamma rays have been identified in the spectrum of one such element, Zr. The spectra of Be, Sc, Fe, Ge, and Zr are presented.

AERE R 5408 UNCLASSIFIED
Atomic Energy Res.Est., Harwell, U.K. UNLIMITED
CALCULATED INDEPENDENT YIELDS IN THERMAL
FISSION OF ^{235}U, ^{239}Pu, ^{241}Pu AND ^{233}U 539.173
Crouch, E.A.C. 546.791.02
May, 1967 13pp., 4ref. 546.799.4.02

The independent yields of the fission products have been calculated for the thermal fission of ^{233}U, ^{235}U, ^{239}Pu and ^{241}Pu by the method of Wahl et al.

(H.L.S.O. 2/6d)

FAM

P 148391 Sci.Rep.1 AFCRL 66-790 UNCLASSIFIED
Utah State Univ., Electrical Engineering Dept., UNLIMITED
Logan, U.S.A.
DEVELOPMENT OF A SYSTEM FOR EXCITING GAS 539.186
MOLECULES BY LOW ENERGY ELECTRONS AF 19(628)-5816
Johnson, J.C., Dolan, C.P.
1.11.1966 87pp., 9ref.

A design study and development of a prototype system for exciting a beam of neutral gas molecules by low-energy electrons is presented. The system described is a cylindrically symmetric electron gun which can direct 1 to 10 eV electrons through a pulsed gas beam having a flux of 10^{19} molecules/sec. At 10 eV, an electron current in excess of 7 μA is regularly observed, while at 4 eV the current is in excess of 1m A. The entire system has internal optics for detecting infrared radiation from the excited molecules as they pass through a well-defined region of space.

FAM

NASA TN D 4044 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
ESTIMATION OF ELECTRON IMPACT EXCITATION CROSS
SECTIONS OF MOLECULAR HYDROGEN 546.11-124
Prok, G.M., Monnin, C.F., et al 539.196.5
June, 1967 38pp., 24ref. 537.533

Cross sections for ionization and excitation of diatomic molecules by electron impact are calculated using a modification of Gryzinski's semi-classical theory. The theoretical model is described. Specific results are given for molecular hydrogen, initially in the ground electronic state, with electron energies ranging up to 360 electron volts. Transitions to principal quantum levels 2, 3, and 4 in both the singlet and triplet systems are considered, including both excitation and exchange since there are competing processes. A total cross section for all states above n = 4 is also calculated, as is the ionization cross section. Theoretical direct excitation and exchange cross sections were compared qualitatively with available line intensity data. Good agreement was found both in the shape of the curve and in the location of the peak. The results are compared with experimental ionization data as well as with results based on the Born approximation. In addition, some results for the nitrogen molecule are presented. The results indicate that the molecular model presented in this report gives acceptable estimates of cross sections for excitation of ground-state molecular hydrogen.

FAM

NUCLEAR REACTOR TECHNOLOGY & NUCLEONICS

NASA TN D 3990 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
TRANSPORT STUDY OF THE REAL AND ADJOINT FLUX
FOR NASA ZERO POWER REACTOR (ZPR-1) 539.125.52
Pieno, D. 621.039.526
May, 1967 87pp., 6ref.

A one-dimensional, multigroup, multiregion S_n transport program has been developed for the IBM 7094 computer. This program has been used to calculate the real and adjoint fluxes for the NASA Zero Power Reactor (ZPR-1). In particular, the effect on the fluxes of a small spherical shell of cadmium located at the centre of the reactor was determined. These calculated real and adjoint fluxes can be used to correct experimental reactivity determinations for materials within the cadmium shell. The effect of S_n order (n = 2, 4, 6, or 8), elastic scattering order (P_0 or P_1), the number of spatial mesh intervals, and angular flux model representation (diamond or step) on the real and the adjoint fluxes at the centre of the reactor and with the cadmium shell in place was determined. The S_4 transport calculations using a diamond model representation of the angular fluxes and using P_1 order elastic scattering were found to be adequate.

FAM

UKAEA RCC R-195 UNCLASSIFIED
United Kingdom Atomic Energy Authority, U.K. UNLIMITED
TESTING THE SOURCE CAPSULE FOR THE RIPPLE III
GENERATOR FOR APPROVAL AS "SPECIAL FORM" 546.42.02.90
(I.A.E.A. TRANSPORT REGULATIONS) 539.12.05
Ansell, K.H. 621.039.8
June, 1967 14pp.

The RIPPLE III source was the first capsule to be approved in the U.K. as "special form". The tests necessary to obtain this certificate of approval are described. The generator contained Strontium 90 in the form of strontium titanate.
(H.M.S.O. 2/6d)

FAM

CHEMISTRY

P 148393 TR1001(2250-40)11 SSD TR 67-68 UNCLASSIFIED
Aerospace Corp., El Segundo, Calif., U.S.A. UNLIMITED
REACTIONS OF ALKYLPEROXY AND ALKOXY RADICALS
(1.12.1966 - 31.1.1967) 541.515
Heicklen, J. 541.21.024
March, 1967 35pp., 39ref. AF 04(695)-1001

The reactions of small alkylperoxy and alkoxy radicals are reviewed and discussed. These radicals can decompose unimolecularly, though their rate constants are often in the second-order region. They abstract hydrogen atoms from alkanes, aldehydes, esters, and acids, add to olefines, and may react with O_2. Furthermore, interactions with other radicals can lead to either disproportionation or combination. Particular attention is given to CH_3O_2 and CH_3O, and a number of rate constants are estimated.

MBC

P 148395 TR1001(2250-20)-3 SSD TR 67-58 UNCLASSIFIED
Vol.1 Vol.1 UNLIMITED
Aerospace Corp., El Segundo, Calif., U.S.A.
CHEMISTRY OF IRRADIATION INDUCED 539.1.044
POLYTETRAFLUOROETHYLENE RADICALS. 678.743.41
VOLUME 1: RE-EXAMINATION OF THE 541.515
EPR SPECTRA (JAN.1966 - JAN.1967) 539.194((538.221))
Seigel, S., Hedgpeth, H. AF 04(695)-1001
April, 1967 34pp., 26ref.

The electron paramagnetic resonance (EPR) spectra of the radicals formed during the γ-irradiation of polytetrafluoroethylene (PTFE) are examined and assigned. It is shown that both chain radicals and propagating radicals are formed and stabilised when PTFE is irradiated in vacuum and at room temperature; the yield of the chain radical is ten times that of the propagating radical. When PTFE is irradiated in air the peroxide radicals are stabilised.

MBC

AD 613642 AFML-TR-64-381 UNCLASSIFIED
Air Force Materials Lab., Wright Patterson AFB, UNLIMITED
Ohio, U.S.A.
A LOWER STANDARD ELECTRON ENERGY FOR ANALYTIC MASS 543.51
SPECTROSCOPY
Dunbar, D.J., Harrah, L.A.
Feb., 1965 35pp.

Ten mass spectra from each of twelve compounds including methane, n-butane, 2-butyne, 1-butene, iso-butene, diethyl ether, benzene, ethanol, iso-pentene, ethyl iodide, toluene and ethyl acetate were obtained using the Bendix time of flight mass spectrometer. The spectra from each compound were obtained at 15, 17, 20, 25, 30, 35, 40, 50, 70 and 100 volts electron bombarding energy. Representative ionization efficiency curves are plotted from each compound. Other spectra are discussed and recommendations made for electron bombarding energies to be used in analytic spectroscopy with the Bendix time of flight instrument.

FAM

P 149107 NRL Rep.6525 UNCLASSIFIED
Naval Res. Labs., Washington D.C., U.S.A. UNLIMITED
A REVIEW OF GAS CHROMATOGRAPHIC - MASS
SPECTROMETRIC METHODS OF ANALYSIS 543.544.25
Saalfeld, F.E. 543.51
23.3.1967 15pp., 79ref. 551.510.4
614.71

Identification of organic contaminants in the closed atmospheres of nuclear submarines or of space vehicles is of great importance for the long-term habitability of these vessels. Therefore, a literature survey of the gas chromatographic-mass spectrometric methods of analysis has been made which provides a comprehensive review of the past and present research efforts on the identification of gas chromatograph effluents with a mass spectrometer. The various types of instrumentation employed are described briefly, and critical assessments are made of the various techniques for tandem operation of a gas chromatograph and a mass spectrometer.

JEP

P 148394 TR 1001(2250-40-10 SSD TR 67-60 UNCLASSIFIED
Aerospace Corp.,El Segundo,Calif.,U.S.A. UNLIMITED
THE REACTION OF NITRIC OXIDE WITH
PERFLUORODIMETHYL PEROXIDE 546.172.6-31
(SEPT.1966 - JAN.1967) 547.412.722-39
Heicklen, J.P., Knight, V.L. 547.261-39
March, 1967 17pp.,2ref. AF 04(695)-1001
The reaction of nitric oxide with CF_3OOCF_3 was studied between 25 and 128 deg.C. The major products are CF_2O, SiF_4, and NO_2, although NO_2 is not an initial product of the reaction at 128 deg.C. The molecule FNO is formed as an unstable intermediate.

MHC

TIL/OT 3626 AERE TRANSL. UNCLASSIFIED
LB/G/2431 UNLIMITED
Atomic Energy Res.Est.,Harwell,U.K.
PREPARATION OF CARRIER-FREE - ^{35}S 546.22.02
(Transl. from publ. of Czechoslovak
Academy of Sciences Nuclear Research
Institute)
Cifka, J., Vins, V.
Dec., 1966 22pp.,53ref.
The literature on the methods of preparation of carrier-free sulphur ^{35}S is reviewed, and the results of the laboratory tests on some of these methods are described. The Yugoslav method of sorption of ^{35}S on aluminium oxide has been chosen for routine production. The production apparatus and operational experience since 1960 are described. Separate sections are devoted to the measurement and decontamination of the ^{35}S activity.

VJB

AERE AM 174 UNCLASSIFIED
Atomic Energy Res. Est.,Harwell,Berks,U.K. UNLIMITED
THE DETERMINATION OF YTTRIUM IN ALLOY
STEELS 669.15-194
Spicer, G.S. 546.641.06
June, 1967 4pp. 543.52
The procedure described uses an isotope dilution technique to determine yttrium in steels which may also contain aluminium. The yttrium is separated as the fluoride and a source in suitable form prepared and counted. The specific activity of this source is compared with standards prepared from a known amount of yttrium.
(H.M.S.O. 1/2d)

FAM

INSTRUMENTATION

NASA TN D 3973 UNCLASSIFIED
National Aero. & Space Admin.,U.S.A. UNLIMITED
STUDY OF DYNAMIC RESPONSE TO IMPACT LOADINGS
OF ACCELERATION SENSORS HAVING VARIOUS 531.76
MOUNTING CHARACTERISTICS 629.7.077
McCarty, J.L., Pearson, J. 620.178.746.4
May, 1967 50pp.,10ref.
An analytical investigation was performed to study the dynamic response to impact loadings of acceleration sensors having various mounting characteristics. Analytically represented impacting bodies were subjected to input force pulses of half-sine, triangular, quarter-sine, and rectangular shapes, approximating typical target impact acceleration signatures. Studies were made with an analogue computer of the acceleration time histories measured by acceleration sensors of different mass which are coupled to the impacting body by a mounting system having various combinations of damping and spring stiffness.

P 148567 UU 66-12 BCI REP. 2. UNCLASSIFIED
AFCRL 66-799 UNLIMITED
Utah Univ., Upper Air Res.Lab., U.S.A.
ELECTROMAGNETIC MEASUREMENTS OF 551.510.3
ACCELERATION 533.6.013.124
Gehmlich, D.K. 531.787.9
Nov., 1966 33pp., 3ref. 533.696.2
AF 19(628)4055

The most common types of accelerometers are examined to determine their suitability for measuring drag accelerations in the falling sphere air density experiment. Only those types having no mechanical friction can detect the low drag accelerations encountered at high altitudes. One type of frictionless accelerometer, having electromagnetic suspension, is considered in some detail. The proof-mass in this system is a steel sphere which is kept at a null position by a closed-loop control system. The ball position is detected optically and the position signal drives a pulse-width modulator which, in turn, drives the magnetic coil through a power amplifier.

VJB

PHOTOGRAPHY

AD 640957 FTD-TT 66-34/1 + 2 + 4 UNCLASSIFIED
Foreign Tech. Div., Wright-Patterson AFB, UNLIMITED
Ohio, U.S.A.
LUMINESCENT INTENSIFICATION (Transl. from Zh. 771.537
nauch. prikl. fotografii kinematografii 771.7
10(3), 219-220, 1966, U.S.S.R.) 535.37
Bukatin Y.A.
25.4.1966. 4pp., 8ref.

The conversion of a silver photographic image into a luminescent one is described.

FBP

NASA TN D-3982 UNCLASSIFIED
National Aero & Space Admin., U.S.A. UNLIMITED
TERRAIN PHOTOGRAPHY ON THE GEMINI IV MISSION:
PRELIMINARY REPORT 629.78 GEMINI
Lowman, P.D., McDivitt, J.A., et al 778.35
June, 1967 15pp., 19ref.

During the 4-day Gemini IV flight in June 1965, about 100 colour pictures of land areas were taken with a 70mm hand-held camera for geologic and geographic study, as part of the synoptic terrain photography experiment. A brief summary of the objectives, methods and results of the experiment is presented. Representative pictures of the southwestern United States, northern Mexico, and portions of Africa and the Arabian peninsula are presented and described. Preliminary study indicates that these pictures will be useful in studying regional structure, revising smallscale geologic maps and searching for and studying impact structures.

VJB

SERVOMECHANISMS

RAE TR/HSL. 1216 UNCLASSIFIED
Royal Aircraft Est., Ministry of Technology, U.K. UNLIMITED
THE SYMMETRICAL OPTIMUM (Transl. from: DAS
SYMMETRISCHE OPTIMUM Regelungstechnik 6(11), 621-50:
395-400 and 6(12), 432-436, 1958, Germany) 517.5
Kessler, C.
Feb., 1967 32pp., 13ref.

Methods are given for the formulation of auxiliary functions which permit control engineering problems to be treated mathematically with greater simplicity. Considerations of symmetry lead to the formulation of an optimization method which makes possible a single parametric adjustment of the control loop.

LJF

AD 639693 GOC/EE/66-18 THESIS UNCLASSIFIED
Air Force Inst. of Tech., School of Engineering, Ohio, U.S.A. UNLIMITED
DIFFERENCE EQUATIONS ADAPTIVE CONTROLLER DESIGN TECHNIQUE 621-52
Stein, T.T. 629.76 X-15
June, 1966 82pp., 11ref.

An "identification" means for adaptive control systems is an average difference equation approximation for the vehicle transfer function. Solution of the difference equation, accomplished in the control computer of the adaptive system, determines which of several fixed compensators to use for existing flight conditions. The difference equation derived for the X-15 longitudinal dynamics is analyzed mathematically for various inputs. The X-15 pitch-rate loop and control computer is simulated on analog and digital computers.

VJB

NASA CR 72102 BRLD 3542 N67-13186 UNCLASSIFIED
Bendix Corp., Res. Labs. Div., Southfield, Mich., U.S.A. UNLIMITED
DESIGN, FABRICATION AND TEST OF A FLUERIC SERVOVALVE (28th March - 28th June, 1966) 621-525
Vos, C.E. 532.525 AMPLIFICATION
39pp. NAS 3-7980

Development tests were performed on a breadboard model of a pneumatic-input flueric servovalve, which operates with no moving parts. The servovalve is designed to operate with H_2 at temperatures from 56 deg.K (100 deg.R) to 333 deg.K (600 deg.R), supply pressure of 148 N/cm^2 (215 lb/in^2 exhaust pressure of 34.5 n/cm^2 (50 lb/in^2, and maximum control pressure of 48.5 N/cm^2 (70.4 lb/in^2). Tests were performed on the power stage vortex pressure amplifier to improve the stability. As an alternative to the vortex pressure amplifier, a vortex bridge type of power stage was also tested. All tests for this period were performed using nitrogen. This report presents the results of tests performed during the fourth three-month period of the programme.

VJB

ELECTRICITY & MAGNETISM

TIL/T 5693 UNCLASSIFIED
Technical Information & Library Services, Ministry of Technology, U.K. UNLIMITED
MEASUREMENTS OF THE COMPLEX DIELECTRIC CONSTANT OF AQUEOUS GLYCERINE AND GLYCERINE-GELATINE GELS AT FREQUENCIES BETWEEN 100 Mc/s AND 15 Gc/s (Transl. from: Z. angew. Phys., 15(6), 501-504, 1963, Germany) 537.226: 547.426.1
Petzel, R., Wielfing, A.
6pp., 4fig., 18ref.

It was found that for glycerine with 13%wt H_2O at 29 deg. C the position curve of the dielectric constant satisfied the same relaxation equation as that of Davidson and Cole for pure glycerine. Measurements of gels with 0 to 20%wt gelatine, from 20 to 60 deg.C showed decreasing dielectric constant and longer relaxation times with increasing gelatine concentration.

NASA CR 775 UNCLASSIFIED
TRW Systems, Redondo Beach, Calif., U.S.A. UNLIMITED
IONIZATION PROBABILITY OF IRON PARTICLES AT METEORIC VELOCITIES 523.5
Slattery, J.C., Friichtenicht, J.F. 537.565
May, 1967 18pp., 9ref. 546.72

The number of ion pairs produced by the total ablation of iron particles in air and argon was measured as a function of particle velocity. Micron size iron particles of known mass and velocity were injected into a gas target chamber and the resultant ionization collected with a parallel plate ionization chamber. Initial velocities of the particles ranged from 20 km/sec to 45 km/sec. The ionization probability β, for an iron particle in argon was found to be $\beta = 2.75 \times 10^{-20} v^{4.13}$, where v is the particle velocity in metres/sec. The ionization probability of an iron particle in air was found to be $\beta = 2.60 \times 10^{-15} v^{3.12}$, with v in metres/sec.

PBP

ELECTROMAGNETIC PROPAGATION

P 148667 F. Sci. Rep. AFCRL 66-746 UNCLASSIFIED
Oslo Univ., Inst. of Cosmo Physics, Norway UNLIMITED
ELF AND VLF EMISSIONS IN NORTHERN SCANDINAVIA 621.371.3.029.4
Egeland, A., Harang, L., et al 551.510.535
20.9.1966. 50pp., 25ref. N 122118:122115
AF 61(052) 811

Naturally-occurring emissions in the ELF- and VLF-band were studied in Northern Scandinavia from June 1964 to August 1966. The investigation was divided into four subgroups: 1. Measurements of different types of hydromagnetic emissions between DC and 6 Hz. 2. Studies of the earth-ionosphere cavity resonance band in the frequency range 6 to 100 Hz. 3. Investigation of the fine structure of the emission band centred at approximately 700 Hz, as well as recordings of the natural electromagnetic spectrum between 1 and 10 KHz. 4. Studies of the enhanced VLF- and LF-emissions at six discrete frequencies between 2.3 and 50 KHz.

PP

P 148366 Sci.Rep.1 AFCRL-67-0224 UNCLASSIFIED
SESW-E 121 UNLIMITED
Sylvania Electronic Systems, Western Operation, Calif., U.S.A. 621.371.332.4
SIGNAL CORRELATIONS IN FORWARD SCATTERING BY TWO-COMPONENT RANDOM DISTRIBUTIONS 621.391:007
681.3.05
Burke, J.E., Keys, T.H., et al U 122131212:10396
24.3.1967 63pp., 13ref.

Experimental data and theory for the scattering of 5-cm microwaves by two-component, moving, random distributions are compared. The component scatterers of the distributions are styrofoam spheres with radii large compared to the wavelength and with relative indices of refraction close to unity; the motion of the spheres arises from turbulent air streams flowing through grids that form the top and bottom of a styrofoam container. The experimental results include the coherent phase, attenuation coefficient, and intensity, the incoherent intensity, the total intensity, as well as other quantities derived from raw data. Preliminary results of digitally processing tape recordings of instantaneous signals are given for a dynamic distribution of four hundred identical spheres. The digital results are compared with corresponding analogue-computer data.

PP

P 148458 Ann.Summ.Rep.1 AFCRL 66-814 UNCLASSIFIED
Ghana Univ., Physics Dept., Legon, Accra, Ghana UNLIMITED
STUDIES OF THE EQUATORIAL IONOSPHERE USING TRANSMISSIONS FROM ACTIVE SATELLITES 551.510.535
(1.2.1964 - 31.1.1966) 621.396.1
Koster, J.R., Katariku, I., et al 629.78 EARLYBIRD
1.8.1966 66pp., 32ref Gh 122115

Chapter 1 reviews the theory of correlation analysis of fading records and gives computer programs for carrying out the analysis. Chapter 2 describes continuous observations over a period of 81 days of the 136 cm/s signal radiated by "Early Bird". Chapter 3 presents the full correlation analysis of nearly 200 spaced receiver drift measurements made at Tamale, Ghana (G. Lat 9 deg.25' N, 0 deg.53' W, Mag. Dip 1 deg.14' S). Chapter 4 is a study of the total electron content of the ionosphere as determined from observations of the Faraday Rotation of 20 mc/s signals radiated by S-66 over a period of 6 months.

TBP

ELECTRICAL ENGINEERING - GENERAL

TIL/T 5714 UNCLASSIFIED
Technical Information & Library Services, Ministry of Technology, U.K. UNLIMITED
THE BURNING-IN OF BRIGHT PLATINUM ON GLASS 669.231.84:
(Transl.from: G.I.T., 8 697-700, 1966, Germany) 666.1
Jeromin, G. 621.3.035.2
Dec., 1966 6pp., 5fig., 12ref.

Taking the example of the preparation of platinum coatings on AR glass by burning-in bright platinum, the influence of method of cleaning the glass, rates of heating and cooling, burning-in temperature and air-flow were investigated and optimum conditions determined. On this basis burning-in instructions were compiled for producing electrodes with a high chemical resistance. The catalytic action of the bright platinum in hydrogenation reactions is being investigated.

RAE LIBR TRANSL. 1130 — UNCLASSIFIED UNLIMITED

Royal Aircraft Est., Ministry of Technology, U.K.
THE THEORY OF SYNCHRONOUS MACHINES UNDER VARIABLE OPERATING CONDITIONS WITH EXAMPLES OF APPLICATIONS AND WITH REFERENCE TO THE MODERN AMERICAN LITERATURE (Transl. from: Maschinenfabrik Oerlikon, Zurich (1952), 1-128, Germany) — 621.313.32
Laible, Th.
Nov., 1965 — 162pp., 5ref.

Derives from first principles the general theory of the transient behaviour of synchronous electrical machines in terms of the Laplace transformation, without using matrix methods. In this respect it supplements the American literature which deals with the topic mainly in terms of the Heaviside operational calculus.

VJB

ELECTRICAL POWER (INCLUDES BATTERIES & FUEL CELLS)

AD 642779 — NOL TR 64-136 — UNCLASSIFIED UNLIMITED

Naval Ordnance Lab., White Oak, Md., U.S.A.
BATTERY SEPARATOR MECHANISMS - LITERATURE SURVEY REPORT — 621.355.8
McClure, C.P. — 621.3.035.3
26.9.1966 — 40pp., 183ref. — 532.72
U 10329

In order to improve the characteristics of batteries, an understanding of battery separators and how they can inhibit the motion of ions and molecules is desired. This report reviews some theories invented to explain the transport of materials through solutions and barriers.

PBP

SEMI-CONDUCTORS, TRANSISTORS

P 140543 — 06414-6001-R000 — FR AFCRL 67-0102 — UNCLASSIFIED UNLIMITED

TRW SYSTEMS, Redondo Beach, Calif., U.S.A.
INVESTIGATION OF LASER RADIATION SIMULATION FOR MICROELECTRONIC DEVICE HARDENING — 621.375.826
(15.5-15.11.1966) — 539.1.043:621.382
McWilliams, D.A., Skeen, C.H., et al — U 14833:10851:156713
27.1.1967 — 84pp., 24ref. — AF 19(628) 5910

Presents the results of a study to determine the feasibility of using a Q-switched neodymium glass laser to simulate transient radiation effects in silicon electronic devices. A laser system has been constructed utilizing a saturable dye as a passive Q-switching element operating in the 0.1 to 1 joule range with single pulsewidths of 20 to 30 nanoseconds. Equivalent silicon doses ranging up to 10^5 rads silicon can be obtained. An empirical and theoretical correlation has been made between carrier generation of the laser radiation and carrier generation due to flash X-rays in both a photoconductive specimen and a fast linear photodiode. Further study was made of the effects of Q-switched laser on transistors and integrated circuits. The current pulses measured agreed with calculated values. The results are similar to the results of flash X-ray studies.

PP

LINES, NETWORKS, FILTERS & WAVEGUIDES

AD 640710 — QPR 5 — UNCLASSIFIED UNLIMITED

Piezo Tech. Inc., Orlando, Fla., U.S.A.
PEM FOR FILTER QUARTZ CRYSTAL 113 Mc, TYPE EL-FR (X-2) AND CRYSTAL UNIT, FILTER QUARTZ TYPES CR (XM-64)/U AND CR(XM-65)/U — 621.372.412
(1.5.-30.7.1966) — 621.315.613.7
Angove, R.B., Fruitt, R.J. — U 1543
1966 — 33pp., 3ref. — DA 36-039-AMC-03638(E)

Describes progress on the fabrication of Pre-production samples of Crystal CR(XM-65)/U and Engineering Samples of Filter EL-FR (X-2).

PBP

NASA CR 763 — UNCLASSIFIED
Hughes Aircraft Co., Culver City, Calif., U.S.A. — UNLIMITED
STUDY OF DIODE-IRIS CONTROLLED WAVEGUIDE SLOT RADIATORS
Formen, B.J., Wada, J.Y., et al — 621.396.677.71
April, 1967 — 41pp., 5ref. — 621.372.852.2
621.382.23
533.951
U 1362:14254:10826:15623

X-band studies concerned with positioning semiconductor diodes and plasma devices about a slot radiator to control the amplitude and phase of the slot radiation were continued in this programme. An iris cluster of four semiconductor varactor diodes was developed that produced 360 degrees of phase control at amplitude levels up to -14.5 db (relative to the incident power) and less phase control for amplitudes up to -7.8 db. Feasibility studies with various gas discharge waveguide irises predicted an electron injection plasma varactor design capable of operation at substantial r-f power levels with a few watts drive power and very low ohmic loss. A four-plasma iris prototype displayed a 125-watt power handling capability and an average ohmic loss of 5%.

DMA

OSCILLATORS & AMPLIFIERS (INCLUDES LASERS & MASERS)

P 148611 — NRL Memo.Rep.1713 — UNCLASSIFIED
Naval Res.Lab., Washington D.C., U.S.A. — UNLIMITED
LASER MATERIALS RESEARCH
Gandy, H.W., Ginther, R.J., et al — 621.3.038.82
July, 1966 — 81pp. — 535.374
U 14837:1059

Studies of non-radiative energy transfer in doubly and triply activated glasses are reported. The utilization of this energy transfer in stimulated emission processes in these glasses has been investigated. Some of the effects observed are: (1) mutual quenching of coactivator luminescence preventing the stimulated emission of either activator species, (2) controllable selection of the lasing species in doubly and triply activated glass, (3) internal or self Q switching, and (4) ultraviolet radiation-induced modulation of stimulated emission. Research results are summarized and discussed.

PP

AD 639058 — FR — UNCLASSIFIED
New England Univ., Armidale, N.S.W., Australia — UNLIMITED
C-W OPERATION OF SPARK TRANSMITTERS
Landecker, K. — 621.373.2
May, 1966 — 61pp., 17ref. — A 1442
NONR(G)0009-64

A spark oscillator and transmitter was developed producing undamped (C-W) oscillations at frequencies of 10 MHz with the aid of a special type of Ferrite transformer and slow wave transmission lines with ceramic high permittivity dielectric.

FBP

P 148363 — B-3546 FR — AFCRL-67-0229 — UNCLASSIFIED
EG & G Inc., Bedford, Mass., U.S.A. — UNLIMITED
STUDIES FOR A GEODETIC LASER SYSTEM
(1.7.1965 - 30.4.1967)
Ackerman, S. — 621.375.826
1.5.1967 — 27pp., 15ref. — 629.78 EXPLORER
629.78 GEOS
523
U 14836:1055
AF 19(628)-5516

Brief summary of photoelectric (range) detection, photographic (direction) detection, and design studies made for a geodetic laser system. Scientific reports and other documents which contain more detailed descriptions of the work and the results are referenced. It appears feasible to measure the displacement between a ground-based (ruby) laser system and a satellite equipped with retrodirective reflector arrays (such as those on the Explorer and Geos satellites) to an accuracy of 2 arc-seconds in direction and less than 10 metres in range at slant ranges of over 200 km, using essentially state-of-the-art equipment described here and in the references. The probability of detection is expected to be greater than 90% without optical tracking, if the direction is known in advance to within approximately 2 arc-minutes and the range to within approximately 1 km.

PP

ELECTRON TUBES

P 148474 AFCRL 66-718 Physical Sci.Res. Paps.280 UNCLASSIFIED UNLIMITED
Air Force Cambridge Res.Labs.,Hanscom Field, Mass.,U.S.A.
PHOTOELECTRON EMISSION IN THE EXTREME ULTRAVIOLET REGION (6.9.1962 - 30.6.1966)
Heroux, L., Hinteregger, H.E., et al
Oct., 1966 88pp.,34ref.
621.383.2
621.3.032.217
535.61-31
621.383.292
U 15682:15681:15686

Photoelectron emission from solid tungsten, nickel, and semitransparent aluminium cathodes exposed to ultraviolet radiation between 256Å and 1216Å has been studied with planar retarding-potential analyzers. The resulting current-voltage diagrams (CVDs) for these three metal cathodes are essentially identical. The photoelectric yields of several metal and alkali halide cathodes commonly used in the extreme ultraviolet were also compared. Those of CsI and LiF were found to depend upon cathode thickness and to be sensitive to the time of ageing in air. Preliminary data on the absolute yield of tungsten between 31.6Å and 304Å are presented.

DMR

P 140094 Res.Pub. GMR 510 UNCLASSIFIED UNLIMITED
General Motors Corp.,Warren,Mich.,U.S.A.
NINE-PIN PRESSES USING DIRECT-GLASS-TO-METAL SEALS
Dolenga, A.
9.11.1965 19pp.,2ref.
621.3.032.53
621.385
621.979
U:15684:1

Direct-glass-to-metal seals have been developed for use in vacuum tubes which also contain hot alkali vapours. Three types of metals (tungsten, molybdenum and Kovar) with six types of glasses (Coming Code Nos. 7052, 7056, 7720, 3320, 1720 and 7740) were tested. Originally the work done was with a one-pin, feed-through type of tube unit, but as most vacuum tubes required more than one feed-through, the work has been extended to a nine-pin, cross-press variety. In essence it is shown that all of the varieties good for the one-pin variety were also successful in the nine-pin, cross-press variety using direct glass-to-metal seals. In addition, wire sizes up to 20 fifty-thousandths of an inch have been sleeved with glass by this method and inserted into functional tube units.

FAM

COMMUNICATION SYSTEMS

AD 641132 TR 9 AFOSR 66-2385 UNCLASSIFIED UNLIMITED
Illinois Univ.,Engineering Experiment Station, Urbana,U.S.A.
A METHOD OF DECODING SPEECH
Gazdag, J.
June, 1966 130pp.,36ref.
534.781
681.3.052
621.391((007))
U 236:10395:212
A.F.ORINT 7-66

A basic method of decoding spoken words into their printed equivalents is described. The concept of "machine event" is introduced. The machine events, which are the basic linguistic elements of the Decoder, are represented by multidimensional binary vectors. The machine representation of the utterances of words as sequences of machine events is discussed. The words are decoded by detecting the significant subsequences of machine events that characterize a particular word.

FBP

P 148358 FR AFCRL 67-0197 UNCLASSIFIED UNLIMITED
Northeastern Univ.,Boston,Mass.,U.S.A.
INVESTIGATION OF SPEECH TRANSMISSION TESTING
Griffiths, J.D.
Feb., 1967 21pp.,3ref.
621.391:534.781
621.391.88
U 1069:2192:12337
AF 19(628)-5889

Four studies to investigate speech perception under various transmitter filter conditions with peak power limited systems and additive Gaussian noise channels. Three S/N ratios corresponding to 80%, 60%, and 40% correct word scores were used as well as 3 different filters: Study 1 showed significant relations between S/N ratios, filters and order of presentation of filter conditions as well as some interaction effects. Study 2, which presented S/N ratios and filter conditions in random order to subjects showed similar significant results. Study 3, a similar study except using a vowel Rhyme list showed a significant main effect only between S/N ratios. Significant filter and S/N ratio effects were obtained in Study 4 which investigated vowels and consonants in one study.

PP

ELECTROACOUSTIC APPARATUS

AD 609397 QPR 2 UNCLASSIFIED
Columbia Broadcasting System Inc., CBS Labs., UNLIMITED
Stamford, Conn., U.S.A.
MICROPHONE HEAD CONTACT M-125 ( )/U 621.395.61
(1.6.-31.8.1964) 621.317.39
Rosenheck, A.J., Dimattia, A.L. U 1067:1066
1964 22pp. DA 28-043-AMC-00010 (E)

Describes work performed toward development of a practical head contact microphone. Final designs of two transducers to be used in contact location research are described. Preliminary head contact measurements revealed wide ranges of signal levels available at the skull, and indicated a need for increased transducer sensitivity. Redesign of both transducers was undertaken, and the modified inertial unit was used in contact locating studies. Location data was obtained at a number of head positions and with two talkers. Overall level variations of about ±8db were obtained. Spectrum analysis of the data was begun, and indicated considerable changes in spectrum as a function of location.

FBP

RADIO

P 148457 FSR AFCRL 67-0187 UNCLASSIFIED
Istituto Universitario Navale, Naples, Italy UNLIMITED
RADIO LINKS AND ANTENNAS IN BOUNDLESS OR
BOUNDED LOSSY MEDIA 621.396.65
Corti, E., Franceschetti, G., et al 621.396.67
30.1.1967 116pp., 33ref. I 213:1226:13211

Consists of three papers: 1. The computation of radio-links in unbounded or bounded lossy media; 2. Computation of impedances, directivities, efficiencies of thin linear antennas in boundless or bounded loss media; 3. A special two parallel plate antenna immersed into a loss medium.

PP

P 148549 Sci.Rep.38 AFCRL 67-0215 UNCLASSIFIED
Institute for Telecommunication Sciences & UNLIMITED
Aeronomy Environmental Science Services
Administration, Boulder, Col., U.S.A. 621.396.674.3
ASYMPTOTIC THEORY FOR DIPOLE RADIATION IN THE 621.3.095.8
PRESENCE OF A LOSSY SLAB LYING ON A CONDUCTING 621.396(253)
HALF-SPACE U 1351:13213
Wait, J.R. PRO 65-504
6.4.1967 18pp., 10ref.

The basic theory for dipole radiation in the presence of a two-layer half-space is outlined with special reference to using it as a model for studying radio propagation through and over heavily vegetated terrain. The source dipole may be located above or below the top surface of the slab. The dipole orientation is either vertical or horizontal. The asymptotic derivations for the field expressions are carried out without making the usual assumption that the refractive index of the uppermost layer is large compared with unity. The final results exhibit the expected inverse square dependence of the fields on the horizontal range.

PP

AD 646143 FR FAA SRDS RD 66-94 UNCLASSIFIED
Wilcox Electric Co., Inc., Kansas City, Mo., U.S.A. UNLIMITED
DESIGN AND DEVELOPMENT OF A CATEGORY 3
ILS MONITOR 621.396.933.23
Owens, N. 629.7.051.83
Nov., 1966 87pp. 621.396.664
U 554:298
FAA-RD-4453

The intention is to design a monitor for the All Weather Landing System which would combine the maximum reliability with the highest degree of simplicity attainable. It has been decided that solid state devices will be used throughout the design for maximum reliability. Also, moving parts will be eliminated in every possible instance. In keeping with the maximum reliability effort necessary for the project, all components are used within the conditions prescribed by generally accepted reliability standards. One main objective of the project has been to design the monitor unit for the best stability within the state of the art. This will enable closer monitor tolerances on the system when operated as a Category III ILS.

DMC

AERIALS

P 148547 F Sci.Rep. AFCRL 67-0200 UNCLASSIFIED
Dayton Electronic Products Co.Inc.,Dayton, UNLIMITED
Ohio,U.S.A.
ELECTRICALLY-SMALL SUPERCONDUCTING ANTENNAS 621.396.67
(1.3.1966-28.2.1967) 537.312.62
Schmidt, B.H. U 13211:1084
April, 1967 143pp.,54ref. AF 19(628) 5893

The advantages and limitations of electrically-small, superconducting antennas have been investigated. The study led to a consideration of miniaturization, physical shape factors, long range magnetic coupling, maximum signal levels, antenna-receiver interface problems, materials, structures, and potential antenna applications of the quantum effects in superconductors. Natural cooling and super directivity were incidental but relevant topics. In general, it was found that the possibility for miniaturization represents the principal advantage of the superconducting antenna, especially at the lower frequencies where antennas often are electrically-small through physical necessity. Radiation efficiency is increased in transmitting antennas, but at the expense of bandwidth. The degree of usefulness of superconductivity in receiving antennas depends considerably on the low noise properties and input impedance of the receiver and on the environment of the antenna. Any cooling improves the performance of the antenna. PP

AD 635268 Thesis UNCLASSIFIED
Illinois Univ.,Urbana,U.S.A. UNLIMITED
A SIMULATION STUDY OF ELEVATION ANGLE OF ARRIVAL
MEASUREMENTS IN THE WULLENWEBER RDF SYSTEM 621.396.674.3
Schlight, H.C. 621.396.677.3
1966 61pp.,7ref. U 1351:13214

Concerns the study of the characteristics of the Wullenweber Antenna System and in particular determination of the vertical angle of arrival, called the Elevation Angle, of an incoming signal.

FBP

P 148545 FR-67-14-151 FR (Pt.2) UNCLASSIFIED
AFCRL 67-0171 UNLIMITED
Hughes Aircraft Co.,Fullerton,Calif.,U.S.A.
INVESTIGATION OF USE OF SUPERIMPOSED SURFACE 621.396.677.3
WAVE MODES (1.2.1966-31.1.1967) 621.372.81.09
Wong, N.S., Tang, R. U 13214:1427
28.2.1967 98pp.,11ref. AF 19(628)4984

A matched radiating element in a phased array antenna over a wide scan has been investigated. This method has been applied in the design of an experimental linear array of 41 elements. Each radiating element consists of an open-ended waveguide driven by an end-on coaxial transition in conjunction with offset posts for the appropriate excitation of the two lowest order modes. The measured input VSWR over a 55 deg. scan angle was less than 1.5 on this experimental linear array. This result agreed fairly well with the predicted value. No degradation on the array pattern due to edge effect was observed on the experimental array with all the elements matched over the 55 deg. scan range.

PP

MECHANICAL ENGINEERING - GENERAL

NASA TN D-3942 UNCLASSIFIED
National Aero. & Space Admin.,U.S.A. UNLIMITED
IMPROVING PERFORMANCE ON FACE CONTACT SEAL
IN LIQUID SODIUM (400° to 1000° F) BY 669.883-404
INCORPORATION OF SPIRAL GROOVE GEOMETRY 621-762
Ludwig, L.P., Strom, T.N., et al
May, 1967 37pp.,20ref.

Conventional face contact seal performance was improved by incorporation of the spiral-groove geometry. Both conventional face contact seals and seals with spiral grooves were used to seal liquid sodium at a pressure of 20 lb/in² gauge (13.8 N/cm² gauge), and a sliding velocity of 79 ft/sec. (24 m/sec). In comparison with conventional face contact seals, seals with spiral grooves had negligible leakage. The wear and contact patterns indicated that the spiral-groove seal operated with separation of the sealing surfaces, which is necessary for long life. Successful low-leakage operation was not achieved with conventional face contact seals having carbide seal seats and nosepieces (hard on hard). Thermal and pressure distortions caused edge contact, wear, and scoring. Conventional face contact seals having seal seats and nosepieces with wear-in properties (soft on hard) showed more leakage than those with carbide sealing surfaces.

FJM

RTS 3618 UNCLASSIFIED
National Landing Library, Russian Translation Programme, U.K. UNLIMITED
CHANGING THE RIGIDITY OF ROTOR SUPPORTS AND ITS EFFECT ON CRITICAL SPEED (Transl. from: Prochnost. i Dinamika Aviats.Dvig.(1),130-155,1964,U.S.S.R.) 621.81-253
Isaev, P.I.
Dec.,1966 39pp.,7ref.
Examines a method of eliminating critical speed of a rotor by means of altering the rigidity of supporting bearings during the operation of the unit. Certain theoretical investigations are submitted, as well as results of experiments made with a single-mass rotor. Theoretical and experimental investigations have established that the described method makes it possible to eliminate critical speed and to enable the rotor to operate within a wider range of r.p.m., both under stationary and transitional conditions, with very low deflection values of the shaft.

ENGINES (PISTON, TURBINE, RAMJET)

NASA CR 797 UNCLASSIFIED
General Motors, Indianapolis, Ind., U.S.A. UNLIMITED
PARAMETRIC STUDY OF ADVANCED MULTISTAGE AXIAL-FLOW COMPRESSORS 621.45.031.3
Miller, L.L., Bryans, A.C. 621.43.018.3
May, 1967 64pp.,2ref.
Presents the results of a parametric multistage compressor study of which the primary objective is to indicate productive areas of study and research development for increasing average stage pressure ratio and reducing compressor overall length. The secondary objective is to correlate compressor design independent parameters and loading parameters to show their effects on average stage pressure ratio and to present them in one compressor design report for reference.

ROF

RTS 3722 UNCLASSIFIED
National Landing Library, Russian Translation Programme, U.K. UNLIMITED
HEAT TRANSFER IN A CIRCULAR JET FLOWING INTO A SLIT (Transl.from: Energomashinostroenie, 1959 (11),5-8,U.S.S.R.) 621.438-71:
536.244
Kuznetsov, L.L.
Nov.,1966 14pp.,3ref.
Experiments were carried out in order to evaluate the efficiency of using air jets flowing into slits to cool gas turbine components. Air was passed through a series of cylindrical jets of 2, 4, 8 and 10 mm diameter mounted in a plate, the distance of the latter from a calorimeter being variable to give different values of the air gap. The method of evaluating the results is explained, and the significance of these results is discussed.

NASA TN D 3959 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
ANALYTICAL STUDIES OF ASPECT RATIO AND CURVATURE VARIATIONS FOR AXIAL-FLOW-COMPRESSOR-INLET STAGES UNDER HIGH LOADING 621.438.031.3
Steinke, R.J., Crouse, J.E.
May, 1967 45pp.,8ref.
The computer program used to make the calculations included the streamline curvature and the radial gradient of the combined profile and shock losses in the radial equation of motion. A radially constant energy addition was used throughout the studies. Compressor-inlet stages with aspect ratios of 3.0 to 6.0 for the case of zero tip curvature and with aspect ratios of 3.0 to 9.0 for the case of high tip curvature were investigated. For an aspect ratio of 8.0, calculations were also carried out at a reduced tip curvature and at a reduced loading.

ROF

LUBRICATION & BEARINGS

NASA TN D 3928 — UNCLASSIFIED
National Aero. & Space Admin., U.S.A. — UNLIMITED
OPERATION OF HYDRODYNAMIC JOURNAL BEARINGS IN SODIUM AT TEMPERATURES TO 800 DEG.F AND SPEEDS TO 12000 RPM — 621.821, 669.883-404
Schuller, F.T., Anderson, W.J., et al.
April,1967 29pp.,8ref.

Experiments were conducted with 1.5 inch-diameter hydrodynamic journal bearings in liquid sodium at 500 deg. and 800 deg.F at speeds to 12000 rpm with unit loads to 31.1 pounds per square inch. Bearings of five different configurations were tested. Tilting-pad bearings were the most stable, followed in order by (1) a plain cylindrical bearing with a herringbone-groove journal, (2) a three-axial-groove cylindrical bearing, pressure fed from an axial shaft pump through a hole in the journal, and (3) three- and two-axial-groove cylindrical bearings.

STB

NASA TN D-3948 — UNCLASSIFIED
National Aero. & Space Admin., U.S.A. — UNLIMITED
BEARING TORQUE AND FATIGUE LIFE STUDIES WITH SEVERAL LUBRICANTS FOR USE IN THE RANGE 500 DEG. to 700 DEG.F — 621.892, 621.822, 536.45
Parker, R.J., Bamberger, E.N., et al.
May,1967 20pp.,5ref.

The objectives of the research reported herein were to determine (1) the operating capability of several lubricants in rolling-element bearings at temperatures from 400 to 900 deg.F and (2) the rolling-contact fatigue characteristics with three representative high-temperature lubricants at 600 deg.F. Seven lubricants, which are considered to be of interest for high-temperature bearing application, were investigated. Each of these lubricants was run with 204 size angular-contact ball bearings made from AISI M-10 steel in the NASA high-temperature bearing torque apparatus to determine the effect of the lubricants on torque characteristics and running-track appearance at temperatures in the range of 400 to 900 deg.F. The effects of three of these lubricants on the rolling-contact fatigue life of test bars at 600 deg.F with a maximum Hertz stress of 700,000 lb/in^2. was determined in the General Electric rolling-contact apparatus. FAM

AD 629415 FTD TT 65-1447/1+2+4 — UNCLASSIFIED
Foreign Tech. Div., Wright-Patterson, AFB, Ohio, U.S.A. — UNLIMITED
MOLTEN METALS AS HIGH-TEMPERATURE LUBRICANTS (Transl. from: Khim.Tekhn.Topl.Masel,1964,(3), 54-58,U.S.S.R.) — 621.892.93, 669-404, 620.193((669-404))
Fialko, N.M., Dintses, A.I.
20.1.1966 8pp.,15ref.

Tests were carried out in quartz test tubes at 500 deg.C for 1 hour to determine the corrosive aggressiveness of a number of liquid metals. These metals were bismuth, cadmium, tin, lead, and zinc and various alloys of these. The constructional alloys on which tests were made with these liquid metals were two heat-resisting steels and two nickel alloys.

GMH

WORKSHOP PRACTICE

UKSM Rep. 67/26 — OPEN DISTRIBUTION
U.K. Scientific Mission, Washington, D.C., U.S.A.
CONTROL TECHNIQUES IN THE STEEL INDUSTRY — 621.771.014:, 65.011.54:, 621.9((681.3))
Bourne, H.K.
May,1967 8pp.

The steel industry is now using modern computer control techniques to improve the quantity and quality of its production: it is also starting to employ solid-state electronics to an even greater extent as it is realized these will enable processes to be further improved. This report describes some typical installations, and gives comments on the use of electronic equipment in the steel industry: it deals specifically with speed control of the finishing train of a hot power mill; direct digital control of a reversing slabbing mill; computerizing a cold rolling mill, and a steel mill engineer's viewpoint of solid-state equipment.

LJF

TIL/OT/8582 JPRS 28.572 N65-15680 UNCLASSIFIED
Joint Publications Res. Service, UNLIMITED
Washington, D.C., U.S.A.
BRAZING STAINLESS STEELS AND HEAT-RESISTING ALLOYS 621.791.36
(Transl. from Payka Nerzhaveyushchikh Stâley i Zharoprochnykh Splavov,Moscow,1964,1-128)
Gubin, A.I.
1.2.1965 128pp.,45ref.
Includes: design of stainless steel and heat-resisting alloy braze joints; brazing preparations; brazes for stainless steels and heat-resisting alloys; brazing fluxes and gas media; brazing methods; quality control of braze joints; safety engineering in melting brazing alloys and in brazing.

AD 627466 ECOM-2651 UNCLASSIFIED
Army Electronics Command, Fort Monmouth, UNLIMITED
N.J., U.S.A.
DESIGN PARAMETERS FOR INERT GAS WELDING AND VACUUM 621.791.754
BRAZING OF VACUUM COMPONENTS 621.791.36
Sullivan, J.J., Schultz, J.B.
Nov.,1965 28pp.,14ref.
Describes in detail the commonly encountered fusion welding and vacuum brazing designs for the construction of modern high vacuum components. In the area of fusion welding, the joining of stainless steel tubing to stainless steel flanges, Kovar tubing to stainless flanges, copper tubing to stainless flanges, thin-wall stainless bellows to stainless flanges, butt welding of stainless tubing, and vacuum chamber construction are discussed. The vacuum brazing section includes brazing of feed-throughs to flanges and flange adapters, tubing to flanges, end-caps to tubing and bellows to flange adapters.

GMH

ROCKETS (INCLUDES ROCKET ENGINES)

NASA TM X-1266 N66-39544 UNCLASSIFIED
National Aero & Space Admin., Washington, D.C., UNLIMITED
U.S.A.
EXPERIMENTAL EVALUATION OF THROAT INSERTS IN A 621.455-225
STORABLE-PROPELLANT ROCKET ENGINE 621.455((662.3-404))
Winter, J.M., Plews, L.D., et al.
Oct.,1966 95pp.,7ref.
A total of 57 throat inserts for ablative-material nozzle sections were tested at a nominal throat diameter of 1.20 inches. The 2 propellants used were nitrogen tetroxide and a blend of 50% hydrazine and 50% unsymmetrical dimethyl hydrazine. Nominal engine conditions included a chamber pressure of 100 pounds per square inch absolute and an oxidant-fuel ratio of 2.0. The materials tested ranged from ablative-reinforced plastics to refractory alloys. No throat erosion, low outer envelope temperature, and structural integrity were the criteria for an acceptable insert. Hypereutectic zirconium carbide met these criteria after two 60-second firing cycles. Refractory metals such as tungsten and molybdenum were found to oxidize rapidly in the test environment. The refractory oxides provide good erosion resistance but suffered thermal shock failures. Pyrolytic graphite gave encouraging results but requires further design work. The best insert was a 0.040-inch-thick pyrolytic silicon carbide coating on graphite, which underwent 4 test cycles totalling 722 seconds before failure.

MHC

NASA CR 54410 FR N65-34229 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
THE DESIGN AND PERFORMANCE OF A 3 KW CONCENTRIC
TUBE RESISTOJET 621.455((662.3-403))
Page, R.J., Short, R.A. 661.96
Sept.,1965 65pp.,25ref.
A 3 kw concentric tube resistojet, using hydrogen as a propellant, was designed for operation from solar cell power supplies. A heat exchanger of unique geometry made possible by the tungsten vapour deposition process permitted cool operation and hence longer life for the boron nitride insulators. In a 25-hour performance test in a vacuum, a specific impulse of 828 seconds was measured at an overall total power efficiency of 0.77, using a precision thrust dynamometer. Stagnation chamber conditions of 8.8 atmospheres and 2417 deg.K were measured. High life expectancy and reliability are apparent features of the design.

MHC

AD 619698 MATECIT PB 65.3 AFRPL TR 65-111 UNCLASSIFIED
Ann. Rep. 1 UNLIMITED
California Inst. of Tech., W.M. Keck Lab. of
Engineering Materials, U.S.A. 621.455((662.3-405))
A CROSS-LINKED POLYMER STANDARD. REPORT ON 678.028
POLYMER SELECTION (1.2.1964-1.2.1965) Proj. 3059
Knauss, W.G. AF 04 (611)-9572
April,1965 56pp.,10ref.

Discusses the desirability of a crossedlinked polymer standard material for investigations of certain aspects of structural integrity evaluation for solid propellant rocket motors, and some of the technical and administrative problems which must be attacked by interested collaborators at various laboratories and research organizations.

FAM

P 148425 NOTS TP 4275 UNCLASSIFIED
Naval Ordnance Test Station, China Lake, UNLIMITED
Calif., U.S.A.
STATUS OF SOLID ROCKET COMBUSTION INSTABILITY 621.455.019.2
RESEARCH
Price, E.W.
Feb.,1967 37pp.,28ref.

A review is presented on the status of research in the U.S.A. with particular emphasis on work in the period 1960-1966.

MEC

RAE LIBY.TRANSL.1182 UNCLASSIFIED
Royal Aircraft Est., Ministry of Aviation, U.K. UNLIMITED
RESULTS FROM MEASURING THE ATTITUDE OF THE
"VERONIQUE" ROCKET BY MAGNETIC SENSORS 629.7.058.47
(RESULTATS CONCERNANT L'ATTITUDE D'UNE FUSÉE 629.76 VERONIQUE
VÉRONIQUE OBTENUS AU MOYEN DE CAPTEURS MAGNÉTIQUES.
Transl. from: Astronautica Acta,8 fasc.5, 1962,
264-277)
Israel, G., Vassy, A.
Nov.,1966 21pp.,7ref.

The use of three magnetic attitude sensors permitting the reconstruction of a rocket's attitude, in spite of mathematical indetermination, by using the continuity of motion, is demonstrated. The causes of error are examined as well as means of improving accuracy. In particular, the case of the V27 rocket is studied. Comparison of the results with data from instruments carried on the rocket shows excellent agreement. The rocket remained nose-up throughout the entire flight, until re-entry into the dense layers at a height of approximately 45 kilometres. After some hesitation, the axis was located on its precession cone, the roll rate at this moment being 55 rpm. A reversal of the direction of roll at t = 32 seconds, a short time before burn-out, was recorded.

P 148583 ESRO SN62(ESLAB) UNCLASSIFIED
European Space Res. Organisation, Paris, France UNLIMITED
DESCRIPTION OF SCIENTIFIC SOUNDING - ROCKET
PROJECTS S-11 629.765
Jaeschke, R. 523.87
Feb.,1967 8pp.,9ref. 523.03((537.531))
629.76 ESRO

ESRO sounding-rocket payload S-11 is comprised of two experiments, R-65 and R-73. The first of these (R-65; Dr. H.E. Butler and Dr. J.W. Campbell, Royal Observatory, Edinburgh) is part of a systematic UV photometric survey designed to measure the total stellar flux in the two wavelength bands centred around 2200 Å and 2600 Å. The other experiment (R-73; Professor D. Brini and Dr. F. Fulignì, Physics Institute, University of Bologna) aims at measuring, by means of scintillation counters, the primary cosmic X-rays in the 20-200 keV range and, if possible, to evaluate the terrestrial albedo of secondary X-rays.

PBP

P 148902 FR AFCRL-67-0253 UNCLASSIFIED
Atlantic Res. Corp., Missiles Systems Div., UNLIMITED
Costa Mesa, Calif., U.S.A.
THE DEVELOPMENT OF DESIGN TECHNIQUES FOR SINGLE-STAGE SOUNDING ROCKETS (1.6.1966-15.3.1967) 551.507.362.1
629.765
Ammons, R.L. AF19(628)-6051
15.3.1967 73pp.,5ref.

Techniques of designing minimum weight rocket vehicles have been explored and a recommended procedure arrived at. Use of this procedure is demonstrated, as is use of statistical weight relationships. A generalized solution to the single-degree-of-freedom, point mass equations of motion is developed and demonstrated.

VJB

P 148938 ESRO TM-8 (ESTEC) UNCLASSIFIED
European Space Res. Organisation, Paris, France UNLIMITED
COMPARATIVE STUDY OF VARIOUS SOUNDING ROCKETS
(In French) 629.765
Guérin, M. 551.507.362.1
Oct.,1966 16pp.

This study was designed to help experimenters select the type of sounding rocket best suited to the launching of their payloads. The 17 types of rockets considered can be arranged into 3 classes (according to calibre and mass of payload). For each of these 3 classes, rocket performance has been plotted, showing how the altitude of the apogee varies with the mass of the payload. Another set of graphs indicate which rocket, in each class, is the most economic for a given payload, under the combined requirements of minimum useful apogee and minimum possible calibre.

JEP

EXPLOSIVES & PROPELLANTS

AD 630641 AFOSR 66-0342 UNCLASSIFIED
Ohio State Univ., Aeronautical & Astronautical UNLIMITED
Engineering Dept., Columbus, U.S.A.
DETONABILITY OF COMBUSTIBLE MIXTURES 662.215.12
Bollinger, L.E. 534.222.2
1965 33pp.,49ref. 662.75
AF-AFOSR 203-65

A limited review is given of experimental and theoretical research on the formation of detonation waves in combustible gaseous mixtures. The initiation, propagation and transition problems were studied in some detail.

MHC

LAND TRANSPORT AND VEHICLES

NASA CR 659 UNCLASSIFIED
Chrysler Corp Detroit, Mich., U.S.A. UNLIMITED
A STATISTICAL TECHNIQUE FOR THE DYNAMIC ANALYSIS OF VEHICLES TRAVERSING ROUGH YIELDING AND NON-YIELDING SURFACES 629.11((624.131))
534.4
Van Deusen, B.D.
March,1967 178pp.,38ref.

A technique has been developed which allows prediction and analysis of the dynamic response of vehicles traversing yielding and non-yielding rough surfaces. Virgin terrestrial and extraterrestrial surfaces are classified according to their frequency and amplitude distribution. A single parameter has been defined which, when properly interpreted, is sufficient to completely specify their surface roughness. This classification determines the nature of a random input to an analogue computer simulation of the vehicle and surface dynamic models. Parametric model analysis can then be performed with the output criteria specified statistically. In addition, deterministic inputs can be used, and a simplified linear model technique is presented using transfer function concepts.

LBT

RAE LIBY. TRANSL.1198 UNCLASSIFIED
Royal Aircraft Est., Ministry of Aviation, U.K. UNLIMITED
DETERMINATION OF THE OPERATING QUALITIES OF AUTOMOBILE TYRES BY THE MODELLING METHOD (Transl. from: OPREDELENIE EKSPLUATATSIONNYKH KACHESTV AVTOMOBIL'NYKH SHIN METODOM MODELIROVANIYA, Avtomobil'naya prom.,(11),28-31,1965,U.S.S.R. 629.11.012.5
Tsukerberg, S.M., Gordon, R.K.
Nov.,1966 14pp.,2ref.

A modelling procedure for the design of tyres is described. With models and full-scale tyres certain parameters (fibre diameter, tyre pressure, stress in the fibre, cord angle) are made identical. Comparisons between 1/7 scale and full-scale have given good results.

VJB

STRUCTURAL ENGINEERING

RAE LIBY TRANSL.1185 UNCLASSIFIED
Royal Aircraft Est., Ministry of Technology, U.K. UNLIMITED
THE USE OF AERODYNAMICS IN STRUCTURAL ENGINEERING (Transl. from Z.Flugwiss.13(4),109-122,April,1965, Germany) 551.556.6
624.042
533.6.072
Ackeret, J.
Oct.,1966 33pp.,18ref.

The effect of wind pressures on structures is considered. Some examples of modern exhibition architecture and typical wind damage are shown. The theories of wind pressure are discussed with reference to Prandtl's work. Some examples are shown of model testing in wind tunnels. The establishment of a European Institute to study these problems is suggested.

VJB

P 149040 ISVR/MEMO.180 Ann.Summ.Rep. UNCLASSIFIED
Southampton Univ., Inst. of Sound & Vibration Res., U.K. UNLIMITED
RESEARCH IN ACOUSTIC FATIGUE AND DAMPING OF STRUCTURAL ELEMENTS (15.2.1966-14.2.1967) 539.43
624.072.2
624.073
534.836
AF 61(052)862
Mead, D.J., Clarkson, B.L., et al.
15.3.1967 27pp.,6ref.

The response of heavily damped beams and plates to acoustic and boundary layer excitation has been studied, both theoretically and experimentally. Finite element methods have been used to calculate natural frequencies of cracked plates under tension, with a view to studying the crack-propagation behaviour. Measurements are reported of the stresses in a rudder panel of a jet-transport aircraft, proceeding through take-off and climb to high altitude cruising flight. The shock-cell phenomenon has been observed to be highly significant.

VJB

TIL/OT/8585 AERE TRANSL LB/O/2482 UNCLASSIFIED
Atomic Energy Res. Est., Harwell, U.K. UNLIMITED
THE AXISYMMETRIC ELASTIC/PLASTIC PROBLEM FOR A PLATE WEAKENED BY A CIRCULAR HOLE (Transl. from: Prikl.Mat.Mekh.,15,519-520,1951,U.S.S.R.) 624.073
Shevchenko, K.N.
Nov.,1966 5pp.,2ref.

Deals with the closed solution of the elastic/plastic problem for a plate loaded within a circular hole by an axisymmetric load. The plate is assumed to be infinite, loaded within the hole by an axisymmetric load.

VJB

AD 626412 ASRL TR 121-11 UNCLASSIFIED
Massachusetts Inst. of Tech., Aeroelastic & Structures Res. Lab., Cambridge, U.S.A. UNLIMITED
DASHER 1: A PROGRAM FOR THE DYNAMIC ANALYSIS OF SHELLS OF REVOLUTION 624.074.4
681.3.06
Wolf, J.A., Mack, E. AF 04(694)-427
Oct.,1965 79pp.,20ref.

Presents an analysis and a computer program which permits determining the transient deformations of an undamped system which contains both inertial and elastic coupling by a timewise step-by-step computational process. The program is developed for the purpose of dynamic analysis of shells of revolution (DASHER). The input to the program consists of the stiffness and consistent-mass matrices which are derived from a finite-element representation of the structure. Three examples are presented to illustrate the application of this program.

VJB

P 148756 SUDAAR 281 AFOSR 66-1667 UNCLASSIFIED
Stanford Univ., Aeronautics & Astronautics Dept., Calif., U.S.A. UNLIMITED
ON A PERTURBATION PROBLEM IN STRUCTURAL DYNAMICS 539.384.4
Dym, C.L., Rasmussen, M.L. 624.075.23
Dec.,1966 26pp.,10ref. AF 49(638)-1276

Perturbation solutions for the differential equation governing dynamic buckling of an elastic column are discussed. A region of validity is suggested for a solution of Hoff's, and an alternate solution which complements the original solution is presented. Results of both cases are compared with results of numerical integration of the full equation.

VJB

P 148012 FFA Rep.107 UNCLASSIFIED
Aeronautical Res. Inst., Sweden UNLIMITED
CREEP DEFORMATION AND BUCKLING OF A COLUMN WITH AN ARBITRARY CROSS SECTION 624.075.23
Samuelson, A. 539.434
1967 31pp.,20ref. 539.384.4

The general equations for a column with an arbitrary cross section, subjected to secondary creep, were derived, using a "multi-flange" model in order to take into account and to predict a nonlinear stress distribution. The equations were solved numerically by means of finite difference methods. A large number of calculations were carried out in order to demonstrate the abilities and limitations of the method. The maximum deflection was found to approach large values within a short interval of time, thus defining exactly the critical time. The shape of the cross section was found to have a significant influence on the creep buckling time and for a non-symmetric section, the direction of buckling was also of importance.

VJB

AIRCRAFT INSTRUMENTS

P 148942 NRL Rep.6473 UNCLASSIFIED
Naval Res. Lab., Washington, D.C., U.S.A. UNLIMITED
THE DEOTH OF FLASH OPTICAL LANDING SYSTEM
Shields, R.H. 629.7.051.83
3.2.1967 16pp.,4ref.

The Depth of Flash Optical Landing System is an optical landing aid which projects a positive glide-slope indication to the approaching pilot, enabling him to achieve highly accurate vertical control of his aircraft on the final landing approach. The signal gives accurate glide path information to a range limited only by the intensity of the light source and atmospheric conditions.

VJB

P 148421 NRL Rep.6521 UNCLASSIFIED
Naval Res. Lab., Washington, D.C., U.S.A. UNLIMITED
THE SHADOW BOX OPTICAL LANDING SYSTEM
Perry, B.L. 629.7.058.74
11.4.1967 12pp.,5ref. 629.7.051.83

A simple replacement for the Fresnel Lens Optical Landing System (FLOLS) was designed and built at NRL for use as a research tool in the experimental testing of various landing aids. Called the Shadow Box Optical Landing System (SBOLS), the new system projects a beam pattern without the use of lenses and is designed to permit parametric variation for experimental purposes. In comparison to the FLOLS, the SBOLS is quite inexpensive, easy to transport, and simple to maintain.

VJB

P 145740 D 228-100-011 Janair Contract UNCLASSIFIED
Bell Helicopter Co., Fort Worth, Texas, U.S.A. UNLIMITED
FINAL TECHNICAL REPORT, JANAIR CONTRACT 4429(00)
(1.5.1964-28.2.1966) (Helicopter flight displays) 629.7.058.74
Dougherty, D.J. 658.3.04
Feb.,1966 30pp.,13ref. NONR 4429(00)

Describes simulator studies aimed at improving the information content of the contact analogue display. They were performed in the JANAIR/Bell Dynamic Flight Simulator and examined pilot performance as a function of: (1) the use of director symbols and changes in grid texture, (2) presentation of flight information on vertical tapes, (3) the use of digital readout of flight information. Flight studies examined the Spectocom Head-Up Display and television in-flight situations in the JANAIR research helicopter. Detailed technical reports of all researches performed under this contract have been issued and are reviewed in this report.

RHH

AIR TRANSPORT (INCLUDES AIR TRAFFIC CONTROL)

P 149048 Ann. Supplement 1967 UNCLASSIFIED
Cornell Univ., Guggenheim Aviation Safety Center, Calif., U.S.A. UNLIMITED
SURVEY OF RESEARCH PROJECTS IN THE FIELD OF 061.1.UBA
AVIATION SAFETY 614.8
1967 95pp. 656.7.08

A record of current unclassified research on which Progress Reports may or may not be available from the sponsor or laboratory conducting the research.

RGF

SPACE SCIENCE

NASA TN D-3972 UNCLASSIFIED
National Aero & Space Admin., U.S.A. UNLIMITED
DYNAMIC SIMULATION OF LUNAR MODULE DOCKING WITH
APOLLO COMMAND MODULE IN LUNAR ORBIT 629.7.076.66
Hatch, H.G., Pennington, J.E., et al. 629.784
June,1967 26pp.,4ref. 629.78 APOLLO

A full-size pilot-controlled simulation of the Lunar-Orbit-Rendezvous docking of the lunar module (LM) with the command and service module (CSM) has been conducted on the six-degree-of-freedom Langley rendezvous docking simulator. Docking the ascent stage of the LM with its top hatch to the CSM was studied, and pilots performed the manoeuvre with only visual observation of the target for guidance information. The objectives of the simulation were to determine if visual aids were needed to complete the docking and to determine the effects of lighting conditions, control mode, and pressure suit on the mission.

VJB

NASA TR R-258 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
TRAJECTORY OPTIMIZATION FOR AN APOOLO-TYPE
VEHICLE UNDER ENTRY CONDITIONS ENCOUNTERED 629.78 APOLLO
DURING LUNAR RETURN 629.7.076.8
Young, J.W., Smith, R.E., Jr.
May,1967 39pp.,12ref.

Describes a numerical optimization study conducted to investigate optimal performance boundaries, from considerations of manoeuvre capability and entry heating, for an Apollo-type vehicle under entry conditions encountered during lunar return. Results presented show the effects on these performance boundaries of variations in initial entry conditions and vehicle characteristics and of constraints on such trajectory variables as altitude and acceleration. The effect of the Earth's rotation on optimal performance is also included. Typical trajectories are presented to illustrate and contrast the basic nature of various optimal entry missions.

VJB

NASA TN D-3985 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
SLOSH DYNAMICS STUDY IN NEAR ZERO GRAVITY -
DESCRIPTION OF VEHICLE AND SPACECRAFT 629.782
Gold, H., McArdle, J.G., et al. 629.7.082.6
May,1967 26pp.,3ref.

The spacecraft carried a television system for observation of the alcohol motion. The damping induced by the slosh baffle was sufficient to damp slosh in less than one-quarter cycle at both longitudinal accelerations. The performance of the WASP vehicle, which provided a period of over 6 minutes of flight above an altitude of 250,000 feet for the 1528-pound payload, was very close to design values on this, its first, flight test.

RGF

LIBY.TRANSL.1212 UNCLASSIFIED
Royal Aircraft Est., Ministry of Aviation, U.K. UNLIMITED
INVESTIGATIONS INTO A METHOD FOR THE OPTICAL
ESTIMATION OF THE ROTATION AXIS OF ARTIFICIAL 629.7.086
SATELLITES (Transl. from UNTERSUCHUNGEN ÜBER EINE 629.783
METHODE ZUR OPTISCHEN BESTIMMUNG DER ROTATIONSACHSE
KÜNSTLICHER SATELLITEN. Deutsche Gesellschaft für
Ortung und Navigation Düsseldorf, Tech. paper to
Committee 7, 10th Nov.,1964,Berlin)
Giese, R.H.
Jan.,1967 44pp.,22ref.

A method is described for determining the orientation of the rotation axis of a spin-stabilized satellite, fitted with reflecting surfaces parallel to the axis, from observations of flashes of reflected sunlight. The conditions in which such flashes may be observed are set out, and some typical visibility patterns have been worked out and are shown in the form of maps. The errors to be expected are discussed in detail, and for most cases the direction of the spin axis may be determined to within ± 0.5 deg.

NASA CR 63396 N65-26416 UNCLASSIFIED
California Inst. of Tech., Jet Propulsion Lab., UNLIMITED
Pasadena, Calif., U.S.A.
SPACE PROGRAMS SUMMARY NO. 37-32, VOLUME IV 629.78
(1.2.-31.3.1965) SUPPORTING RESEARCH AND ADVANCED NAS7-100
DEVELOPMENT
30.4.1965 308pp.,215ref.

Contents: Systems analysis; Computer applications; Environmental requirements; Spacecraft secondary power; Guidance and control analysis and integration; Guidance and control research; Materials, Lunar spacecraft development; Applied mechanics; Instrumentation; Aerodynamic facilities; Solid propellant engineering; Polymer research; Research and advanced concepts; Liquid propulsion; Lunar and planetary instruments; Space instruments; Space instrument systems; Chemistry; Fluid physics; Physics; Applied science; Communications elements research; Communications systems research; Information processing; Communications systems research; Planetary radar; Communications systems research; Communication and tracking.

MEC

NASA TN D 4009 — UNCLASSIFIED
National Aero. & Space Admin., U.S.A. — UNLIMITED
EFFECTIVENESS OF ENVIRONMENT-SIMULATION TESTING FOR SPACECRAFT — 629.78:
New, J.C., Timmins, A.R. — 620.162
June, 1967 — 9pp., 3ref.

The philosophy and purpose of ground simulation tests for unmanned spacecraft, as used at the Goddard Space Flight Centre, is reviewed. Laboratory test results are presented from 16 prototype and 48 flight spacecraft. The summarized results show a four-to-one ratio in problems per spacecraft for prototype compared to flight models, and for both models the simulated space test has revealed the largest number of problems. A comparison of the number of space problems with test problems on the same spacecraft shows no correlation and shows that 100% trouble-free operation was not obtained on any spacecraft. Data from simulated space testing of 270 experiments for an observatory programme show an exponential relationship of malfunctions with time.

VJB

NASA CR 730 — UNCLASSIFIED
Westinghouse Defense & Space Center Baltimore, MD., U.S.A. — UNLIMITED
HANDBOOK OF ORBIT POSITION CONTROL FOR PASSIVE COMMUNICATIONS SATELLITES — 629.783 / 531.352
May, 1967 — 189pp., 4ref.

Considerable weight savings may be realized in a system of passive communications satellites if: Lenticular reflecting shapes rather than spherical reflectors are used; Angular positions of the satellites are controlled rather than allowed to drift randomly. In part 1, an introductory discussion is presented of orbit position control techniques using direct solar pressure and thermal reradiation forces to control the orbit energy and the relative angular position of satellites in orbit; in part 2, complete parametric data are presented related to these techniques; and part 3 presents derivations of scaling factors and other related information.

PBP

P 149038 TR 1001(2307)11 SSD TR 67-79 — UNCLASSIFIED
Aerospace Corp., El Segundo, Calif., U.S.A. — UNLIMITED
EFFECTS OF ATMOSPHERE ROTATION RATE ON ORBITS AND ORBIT DETERMINATION (APRIL, 1966-FEB., 1967) — 531.352
Freund, R.B. — 551.557
April, 1967 — 32pp., 3ref. — AF 04(695)-1001

The effect of increased atmosphere rotation rate on low perigee altitude orbits and the effect of underestimation of atmosphere rotation rate on orbit determination are displayed using simulation results. Crosstrack changes in satellite position due to increased rotation rate are small. Intrack changes, though larger, are small-error sources in orbit determination and short-term prediction if a seven-parameter fit is used. The angles between satellite inertial velocity and wind vectors that produce zero tangential acceleration and maximum normal acceleration are derived for any wind and for the special case of a circular orbit in a rotating atmosphere. This analysis explains the increased decay rates of some near-polar orbits due to a rotating atmosphere and the inability to predict this effect with frequently used approximations.

ROF

SPACECRAFT

NASA TR R-252 — UNCLASSIFIED
National Aero. & Space Admin., U.S.A. — UNLIMITED
SYNCOM ENGINEERING REPORT VOLUME II
April, 1967 — 197pp., 18ref. — 629.78 SYNCOM / 629.783

The second of two volumes on the Syncom Satellite System covers the launch of the Syncom III satellite, its performance during the first 100 days in orbit, the televising of the 1964 Summer Olympic Games by means of the satellite and various communications tests conducted with it.

DMA

P 148342 ASE-1457 FR AFCRL-66-772 UNCLASSIFIED
American Science & Engineering Inc., UNLIMITED
Cambridge, Mass., U.S.A.
SATELLITE AND ROCKET DATA ANALYSIS (11.10.1965- 629.78 HITCH HIKER I
10.10.1966) 629.78 BLUE SCOUT
Paolini, F., Theodoridis, G. AF 19(628)-5712
17.2.1966 126pp.,4ref.

The results of the reduction and analysis of data obtained from instrumentation flown on the Air Force Satellite Hitch-Hiker I (1963-25B) and the Blue Scout Vertical Probe CRL-35 are presented. The Hitch-Hiker I instrumentation included two electrostatic analyzers (one for electrons, 15 to 100 keV, the other for protons, 15 to 100 keV) and an electron scintillation spectrometer (0.5 to 4.0 MeV); the vertical probe instrumentation included a proton solid-state spectrometer. Detailed data on integral energy spectra, pitch angle distributions and perpendicular unidirectional intensities, and iso-intensity contours, as functions of B, L (or λ ,L) and time are given in four papers appended to this report. A fifth paper discusses the theory and use of electrostatic analyzers.

VJB

P 148934 UTIAS Rep.126 AFOSR 67-0858 UNCLASSIFIED
Toronto Univ., Inst. for Aerospace Studies, UNLIMITED
Canada
AN ATTITUDE CONTROL SYSTEM TO CONSTRAIN THE SKIN 533.665 RE ENTRY
TEMPERATURE OF A MANNED LIFTING SPACECRAFT DURING 629.782
REENTRY INTO THE EARTH'S ATMOSPHERE 629.7.062.2
Fine, J.H.
July,1967 145pp.,40ref.

An attitude control system to regulate the temperature of a manned lifting spacecraft during reentry into the Earth's atmosphere is proposed. Its use prevents the peak skin temperature that is experienced during the reentry from rising moderately beyond that which would occur during an equilibrium glide of the same vehicle.

ROF

P 148584 ESRO SR50 UNCLASSIFIED
European Space Res. Organisation, Paris, France UNLIMITED
NEW PARTICLE MEASUREMENTS BY A SATELLITE IN A
HIGHLY ECCENTRIC POLAR ORBIT 629.783
O'Brien, B.J. 523.03
May,1966 17pp.,7ref.

Discusses the need for a high-altitude high-inclination satellite, instrumented with magnetometer, plasma detectors, and detectors of energetic particles, to make experimental measurements in regions of the magnetosphere as yet unexplored.

PBP

P 148475 AFCRL 66-868 Special Reps. 54 UNCLASSIFIED
Air Force Cambridge Res. Labs., Hanscom Field, UNLIMITED
Mass., U.S.A.
SUMMARY OF AFCRL ROCKET AND SATELLITE 629.76
EXPERIMENTS (1946-1966) 629.783
McIntyre, A.
Dec.,1966 57pp.

Provides a chronological summary listing of all rocket- and satellite-borne scientific experiments conducted by Air Force Cambridge Research Laboratories (AFCRL) and its contractors since the inception of the AFCRL Rocket and Satellite Programme in 1946.

PBP

NASA TN D 3995 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
THERMAL CONTROL CONSIDERATIONS FOR A MANNED
ORBITING SPACE STATION 629.786
Taylor, J.T. 629.7.048.7
May,1967 40pp.,2ref.
Analyzes the advantages of combined passive and active methods for the thermal control of a manned orbital laboratory. The object of the analysis was the reduction of the space radiator heat load by rejecting the heat into space through the module walls. This was done by using external surface coatings. Analyses were conducted on two laboratories, each with crews of 18 and 24 men, at three different power levels. A combination passive and active system is recommended.

VJB

MECHANICAL PROPERTIES OF MATERIALS

AERE TRANSL.1061 UNCLASSIFIED
Atomic Energy Res. Est., Harwell, U.K. UNLIMITED
NON-LINEAR ELASTICITY THEORY OF STRAIGHT
DISLOCATIONS (Transl.from Z.Naturforschung,15a, 539.2
756-772,1960,Germany
Pleiderer, H., Seeger, A., et al.
1966 30pp.,27ref.
The stress function method for the solution of internal stress conditions is developed in a general form, on the basis of the Riemann-Cartan dislocation geometry. The practical calculation of plane internal stress conditions in an isotropic medium is represented in detail in terms of the elasticity theory of second order. Simple relationships are obtained for continuous distributions of straight parallel screw or edge dislocations. With the aid of the formulae obtained, the stress fields of single screw and edge dislocations are calculated in quadratic approximation, which lie at the centres of hollow circular cylinders with stress-free edges. As a supplementary result we obtain the well-known Zener formula for the mean volume expansion with internal stresses from the quadratic elasticity theory.

VJB

P 149096 AFOSR 65-1556 UNCLASSIFIED
North Carolina Univ., Mathematics Dept., UNLIMITED
Raleigh, U.S.A.
SURVEY OF ARTICLES ON THE APPLICATIONS OF INTEGRAL 539.31
TRANSFORMS IN THE THEORY OF ELASTICITY GRANT
Uflyand, Ya. S. AF-AFOSR.444-64
1.10.1965 402pp.,241ref.
The object of the present monograph is the systematic presentation of the methods connected with integral transforms of various kinds applicable to the boundary value problems in the theory of elasticity. The author has tried to embrace under a single head a wide class of problems of elastic equilibrium, beginning with comparatively simple ones, soluble by means of the classical integral expansions of Fourier type, and finishing with complicated mixed boundary value problems, treated in the last few years by applying special integral transforms.

VJB

P 149033 MLB 206-M(5) PR 5 UNCLASSIFIED
National Res. Council, Materials Advisory UNLIMITED
Board, Washington, D.C., U.S.A.
FIFTH PROGRESS REPORT BY THE AD HOC COMMITTEE 539.374
ON METALWORKING PROCESSES AND EQUIPMENT 621.7.011
April,1967 14pp. DA-49-083 OSA-3131
During the period from June, 1966 to April, 1967 covered in this report, the Committee has reviewed the state of knowledge of the following topics: (1) Mechanisms of ductile failure; (2) Formability limits; (3) Mechanical property changes by plastic strain cycling. Recommendations for action are proposed.

GMH

AD 605882 FTD-MT 63-115 UNCLASSIFIED
Foreign Tech., Div., Wright-Patterson AFB, UNLIMITED
Ohio, U.S.A.
THEORY OF THE ACCUMULATION OF FATIGUE DAMAGE 539.431
DURING AN ASYMMETRICAL CYCLE OF RANDOM STRESSES.
(Transl. from Izvestiya Vysshikh Uchebnykh
Zavedeniya Mashino-Stroyeniye, SSSR, 1962, NR
(12), 21-32, U.S.S.R.)
Shukaillo, V.P.
26.12.1963 17pp., 1ref.

This work considers the problem of determining structure durability during asymmetric cycle of simple and complex forms of continuous, and also discrete, random stresses. The general formulas of durability are obtained on the basis of linear and nonlinear theories of accumulation of fatigue damage. The extremeness of the linear law of fatigue damage accumulation is established. The upper and lower limits of the durability ratio, calculated by nonlinear and linear theories of fatigue accumulation are found for the general case of load.

GMH

AD 645073 AFML-TR-66-149 Part I UNCLASSIFIED
Air Force Materials Lab., Wright-Patterson AFB, UNLIMITED
Ohio, U.S.A.
MECHANICS OF COMPOSITE MATERIALS. PART I: 669.018.95
INTRODUCTION 678.046
Tsai, S.W.
June, 1966 39pp.

The principles of mechanics are utilized for the description of the behaviour of fibre-reinforced composites. Principal components of elastic moduli and strength for an orthotropic material are established as the intrinsic micromechanical properties. Micromechanics analyses provide a rational design basis of these properties from the material and geometric properties of the constituent materials. A bridge between the properties of the constituent materials and the structural behaviour of a laminated anisotropic composite can then be established. Combined materials and structural design becomes feasible. Finally, test methods of composite materials are evaluated. The principles of mechanics can be used to select the material properties to be tested and the appropriate test procedures to be followed.

GMH

TESTING OF MATERIALS

NASA TM X-52270 N67-17830 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
A METHOD OF ESTIMATING HIGH TEMPERATURE LOW
CYCLE FATIGUE BEHAVIOR OF MATERIALS 620.178.38
Manson, S.S., Halford, G.
22pp., 15ref.

A method is described whereby static tensile and creep-rupture properties can be used to estimate lower bound, average, and upper bound low cycle fatigue behaviour in the creep range. The method is based primarily on the method of universal slopes previously developed for estimating room temperature fatigue behaviour, and in part on a highly simplified creep-rupture - fatigue analysis. Reasonable agreement is obtained when the estimates are compared with total strain range-life data for numerous engineering alloys. Included in the study are coated and uncoated nickel-base alloys, a cobalt-base alloy, low and high alloy steels, and stainless steels tested under laboratory conditions over a wide range of temperatures and cyclic rates.

GMH

NASA-CR-768 UNCLASSIFIED
TRW Systems, Redono Beach, Calif., U.S.A. UNLIMITED
TECHNIQUES FOR THE OBSERVATION OF MICROMETEORITE
CRATERS IN METAL SUBSTRATES UTILIZING ELECTRON 620.187
MICROGRAPHIC METHODS 552.6
Slattery, J.C., Sloan, R. 623.562.5
April, 1967 59pp., 2ref. NASW-1116

A programme is being conducted to develop, refine and reduce to routine practice the techniques required to obtain high quality electron micrographs of craters in metallic targets produced by microscopic hypervelocity particle impact. The programme requires that the craters, ranging in size from 0.1 to 10 microns be reproduced so that the various crater dimensions can be accurately measured. Direct and indirect replication processes, which both terminate with a preshadowed atomic replica available for viewing, are described.

GMH

AD 646243 7518-8-F UNCLASSIFIED
Michigan Univ., Institute of Science & Tech., UNLIMITED
Ann Arbor, U.S.A.
BASIC STRUCTURE OF INFRARED GLASSES 666.246.3
(1.8.1965-31.12.1966) NONR 1224(57)
Levengood, W.C., Vong, T.S.
Jan., 1967 23pp.,14ref.

A phenomenological theory, designated herein as the unified glass theory, is presented. The theory introduces the concept of order-disorder transistions and liquid-model transformation within a glass network and was found to be useful in elucidating and predicting structural behaviour. The degree of order and the structural characteristics of a glass system were represented by three existing models of liquid structure: Bernal, Stewart and Frenkel. The unification of these three liquid models constitutes the basis of the proposed theory. Structure-sensitive flaws were utilized extensively in the study to facilitate the formulation of this network hypothesis. The unified glass theory has been applied successfully in categorising various investigated vitreous systems, among them a nonoxide arsenic trisulphide glass, metaphosphate glasses, and barium silicate infrared systems. Microyield

(continued)

AD 646243 (continued)

phenomena were critically examined, and the relationships between trace width and flaw number parameter are discussed. A correlation was suggested between the critical stress of defect formation and liquidus temperatures within a field of barium silicate infrared glasses.

FAM

AD 643201 TR R499 UNCLASSIFIED
Naval Civil Engineering Lab., Port Hueneme, UNLIMITED
Calif., U.S.A.
AIRFIELD MARKING PAINTS II: EFFECT ON LIFTING OF 656.71
SLURRY SEAL (NOV.,1964-MAY,1966) 667.624.4
Driske, R.W. 621.762
Dec., 1966 18pp.

A study was made to determine the basic causes of lifting of slurry seal from asphaltic subgrade under stripes of reflectorized airfield marking paint. Lifting was greater for double-thickness than for single-thickness stripes, especially for those with paint formulations containing chlorinated rubber. Paints with lower boiling solvents caused less lifting than those with higher boiling solvents. Oleoresinous paints generally caused more lifting than alkyd paints. Oleoresinous formulations with highly aromatic solvents caused less lifting than those with solvents of lower aromaticity. Alkyd formulations with highly aromatic solvents caused more lifting than those with solvents of lower aromaticity, but the amount of aromaticity-associated lifting was less than with oleoresinous paints. The addition of a small amount of carbon black reduced lifting with oleoresinous paints but had little effect with alkyd paints. There was somewhat greater lifting with 12-inch than 4-inch-wide stripes. Numerous interactions that significantly affected the extent of lifting occurred between the paint variables investigated.

FAM

AD 643202 TR R 500 UNCLASSIFIED
Naval Civil Engineering Lab., Port Hueneme, UNLIMITED
Calif., U.S.A.
AIRFIELD MARKING PAINTS - III: DETERIORATION 667.61
ON UNSLURRIED ASPHALT 656.71
Drisko, R.W. 656.7.055
Dec., 1966 17pp.,6ref.

A study was made to determine the basic causes of deterioration of white airfield marking paints on unslurried asphalt. Deterioration was greater for double-thickness than for single-thicknesses stripes, and greater for paints with chlorinated rubber than those without chlorinated rubber. Alkyd resin paints generally performed better than oleoresinous paints. Oleoresinous formulations with highly aromatic solvents performed better than those with solvents of lower aromaticity. Alkyd formulations with solvents of low aromaticity performed better than those with more aromatic solvents. Both alkyd and oleoresinous paints performed better with solvents of lower boiling range. The addition of a small amount of carbon black was slightly beneficial overall, most notably to double-thickness stripes of alkyd paint.

MHC

AD 601299 PDC Search 63-014 PDL 46448 UNCLASSIFIED
National Res. Council Prevention UNLIMITED
of Deterioration Center, Washington, D.C.,
U.S.A. 668.3
BIBLIOGRAPHY ON METAL-BONDING ADHESIVES 621.792.3
Lee, R.W.H. 016
4.2.1963 9pp.,106ref.
About 106 references are quoted.

FAM

AD 443256 3-06-63-2 N64-26823 UNCLASSIFIED
Special Bibl. UNLIMITED
SB-63-77
Lockheed Missiles & Space Co., Sunnyvale, 016
Calif., U.S.A. 629.78
ADHESIVES, SEALS, GASKETS, AND POLYMERIC 678.01
MATERIALS FOR AEROSPACE APPLICATIONS: AF33(657)-10107
AN ANNOTATED BIBLIOGRAPHY
Abbott, H.M.
Nov., 1963 195pp.,401ref.
This bibliography contains 401 selected references to polymeric materials, seals, gaskets and sealant for use in aerospace applications. Such materials may be exposed to high or low temperatures, ultra-violet or high energy radiation. Author, corporate source and subject indexes are included. Previous references were published in AD 267531.

FAM

AD 451216 FR N65 10913 UNCLASSIFIED
Hercules Powder Co., Allegany Ballistics Lab., UNLIMITED
Cumberland, Md., U.S.A.
DESIGN INFORMATION FROM ANALYTICAL AND EXPERIMENTAL 678.046.36
STUDIES ON FILAMENT WOUND STRUCTURES SUBJECTED TO
COMBINED LOADING (FEB.,1962-JAN.,1964)
Bishop, W., Shaw, D., et al.
116pp.
The purpose of this programme was to gain information on the failure envelope and elastic constants of glass-reinforced plastic structures so that filament-wound rocket cases could be designed to withstand unsymmetrical loads. Specifically, the objectives were to establish a reliable method of calculating skin stresses, a reliable set of rules giving the allowable combinations of skin stresses, and a reliable way of estimating buckling loads. The programme to accomplish these goals was both theoretical and experimental. The theoretical phase involved the development of analytical methods for predicting the stress failure of a rocket chamber subjected to combined loads. The experimental phase involved the development of testing procedures and the generation of data for guidance of the analytical methods.

FAM

AD 642092 R 668D 55 UNCLASSIFIED
General Electric Co., Missile & Space UNLIMITED
Div., Philadelphia, Pa., U.S.A.
APPLICATIONS AND OPTIMIZATIONS OF STRUCTURAL 629.7.025.1
COMPOSITES FOR AIRCRAFT WINGS. (Presented at 678.046.36
23RD MEETING OF THE STRUCTURES AND MATERIALS 061.3"10.1966"
PANEL, AGARD PARIS, FRANCE, OCTOBER 5, 1966)
Dow, N.F.
Oct., 1966 27pp.,18ref.
By structural efficiency evaluations the potential of advanced filamentary composites for improvements in aircraft wing construction is assessed. Various optimised structural approaches are considered, but it is shown that really only through the utilization of such enhanced stiffness/density and strength/density properties as the composites make accessible can substantial weight savings be achieved.

FAM

AD 645950 Rep.1824 FR UNCLASSIFIED
David Taylor Model Basin., Washington, D.C., U.S.A. UNLIMITED
INVESTIGATION OF FILAMENT REINFORCED PLASTICS FOR DEEP-SUBMERGENCE APPLICATION 678.046.36 623.827 532.58
Hom, K., Couch, W.P.
Nov., 1966 63pp.,21ref.

The results to date of structural research programmes to investigate light-weight, glass-reinforced plastics or composite materials for deep-submergence vehicles are summarized. Of significance from these studies is the need to consider effects attributable to the matrix material and bonding between fibres and matrix, that is, maintaining integrity of the structure in a water environment under high pressure and utilizing hull concepts which lend themselves to shear-sensitive materials. Plans for present and future structural research to be conducted at the David Taylor Model Basin to study more extensively the use of fibre-reinforced plastic materials for pressure hull application are also reviewed.

FAM

NASA CR 796 UNCLASSIFIED
Whittaker Corp., San Diego, Calif., U.S.A. UNLIMITED
FIBROUS REINFORCEMENTS FOR SPACE APPLICATIONS
May, 1967 38pp.,77ref. 678.046.36 678.7-494 629.78

The properties of several polymeric materials obtained from a review of available data were defined and tabulated. Information on the polymeric material for both film and fibre forms, where available, was tabulated. Potential polymer classes for further development as materials for space applications were identified.

MBC

AD 645432 Semi-Ann.Rep.2 67-48-CM UNCLASSIFIED
Colorado Univ., Boulder, U.S.A. UNLIMITED
RUBBER RESEARCH. THE SYNTHESIS OF SPECIAL FLUORINE-CONTAINING MONOMERS. (1.6.-1.12.1966) 678.86
Park, J.D., Lacher, J.R. DA19-129-AMC-860(N)
15.12.1966 24pp.,4ref.

Further work on the syntheses of fluorine-containing olefins and diolefins is reported. Studies directed toward syntheses of derivatives of perfluorobicyclobutyl and perfluorobicyclobutenyl have been initiated. Of particular interest is the preparation of 2,2'-diiodo-per-fluorobicyclobutenyl by photolysis of 1,2- diiodotetrafluorocyclobutene. Starting from 1,2-dichlorohexafluorocyclopentene, other dihalo- and mixed dihalohexafluorocyclopentenes have been prepared, and from these have been prepared monethoxy derivatives, such as 1-iodo-2-ethoxyhexafluorocyclopentene.

FAM

METALLURGY

P 14942 Sci Rep. 3 UNCLASSIFIED
Liverpool Univ., Metallurgy Dept., U.K. UNLIMITED
ON THE TRANSFORMATION OF INDICES BY TWINNING 669.017: 548.24
Bevis, M. AF 61(052)-920
9.5.1967 28pp.,23ref.

The transformation matrices which describe the transformation of the contravariant and covariant components of vectors by twinning shears of conventional and non-conventional types are derived. Conventional twinning shears are considered in detail, some relevant properties of the transformation matrices are discussed, and some examples of the application of the analysis are presented.

GMH

AD 645345 TR 2 UNCLASSIFIED
Massachusetts Inst. of Tech., UNLIMITED
Metallurgy Dept., Cambridge, U.S.A.
GROWTH OF COMPOSITES FROM THE MELT 669.017:
Mollard, F.R., Flemings, M.C. 621.761
Nov., 1966 108pp.,70ref. 536.421.4
NONR-3963(02)

Conditions necessary for plane front growth of two-phase solids from a single phase melt are discussed. The general case is considered where, at equilibrium, the alloy solidifies over a range of temperatures; i.e., it is not of eutectic composition. It is concluded that: (1) plane front solidification is favoured by low growth rate, steep thermal gradient, and essential absence of convection; and (2) for steady state solidification, the structure should resemble that of directionally solidified eutectics (lamellar, rod-like). Factors affecting solute redistribution along the growth direction are described quantitatively, by numerical solutions to the diffusion equation.

GMH

AD 637143 88C-173 UNCLASSIFIED
Brown Univ. Providence R.I. U.S.A. UNLIMITED
EXHAUSTION OF DUCTILITY UNDER NOTCH CONSTRAINT
FOLLOWING UNIFORM PRESTRAINING 669.14
Mylonas, C., Kobayashi, S., et al. 621.787
Aug., 1966 39pp.,5ref. 539.56
NObs-88294

The purpose of the present work is to measure the amount of uniform precompression of ABS-B and Project E-steel resulting in brittle fracture under the strong constraint of a subsequently machined severe circumferential groove. The elongation at the shoulders, measured with a special extensometer, was found to be a far more sensitive measure of brittleness than the average fracture stress. Prestrains as low as 0.05 caused a reduction of the elongation at the shoulders from about 0.017 - 0.050 in. to about 0.003 - 0.006 in. At low prestrains average fracture stress equalled or exceeded the theoretical flow limit of 2.68 $\sigma_{0.1}$, where $\sigma_{0.1}$ is the 0.1% proof stress in simple tension at the same prestrain.

GMH

P 148579 Sci. Rep. 2 UNCLASSIFIED
Liverpool Univ., Metallurgy Dept., U.K. UNLIMITED
DEFORMATION AND TRANSFORMATION TWINNING IN
Fe-23%Ni-0.8%C MARTENSITE PLATES 669.15'24
Bevis, M., Rowlands, P.C. 669.112.227.342
17.4.67 44pp.,24ref. 548.73
AF61(052)-920

Recent determinations of the habit planes associated with deformation and transformation twinning in Fe-23% Ni-0.6% C martensite plates are reported. Details of the experimental procedure, which include a Kossel X-ray diffraction technique utilising an electron-probe microanalyser for determining the orientations of sections of small martensite plates, as well as a detailed analysis of the crystallography of twinning modes likely to be operative in martensite plates are presented. Possible implications of the unexpected experimentally determined habit planes which are consistent with theoretical predictions are discussed.

GMH

NASA CR 80657 N67-13536 UNCLASSIFIED
National Aero. & Space Admin., U.S.A. UNLIMITED
DEVELOPMENT OF HIGH-TEMPERATURE
CHROMIUM ALLOYS 669.265
Clark, J.W., Wukusick, C.S.
22.4.1966 54pp.,13ref.

Some 40 chromium alloys have been induction melted, cast as ingots of about four pounds each, and processed to small-diameter bar stock. In addition, over 150 compositions were arc melted as 50 to 100 gram buttons and were selectively evaluated with respect to critical properties. Several of the dilute, dispersion-strengthened alloys exhibited ductility at sub-zero temperatures combined with tensile strength over 35,000 lb/in.^{2} at 1900 deg.F (1038 deg.C). Addition of 4 atomic percent Mo raises the tensile strength of carbide-containing alloys to about 60,000 lb/in.^{2} at 1900 deg.F, with the expected expense to low-temperature ductility.

GMH

P 148557 QPR2 NSTIC/08894/66 UNCLASSIFIED
Q-B2195-2 UNLIMITED
Franklin Institute Res. Labs.,
Philadelphia, Pa., U.S.A. 669.28-172
THE MICROSTRAIN REGION IN HIGH-PURITY 548.4
REFRACTORY METALS (1.6.-31.8.1966) NONR-4134(00)
Prekel, H.L., Lawley, A., et al.
1966 15pp.,5ref.

It is shown that the hydrogen annealing treatments which are required in the preparation of molybdenum single crystals suitable for dislocation velocity experiments leave the remaining dislocations in an unpinned state. Some tentative dislocation velocity determinations are presented leading to an activation volume $v^* \sim 20b^3$ in agreement with values of $v^* = 15b^3$-$25b^3$ found by strain-rate change experiments in the macro-strain region. The micro-strain behaviour of molybdenum single crystals treated in hydrogen in a similar fashion is examined. The true elastic limit τ_E, the dissipative friction stress τ_F, and the activation volume v^* were determined. The results are compared to those obtained with as-zone-refined crystals.

GMH

AD 649187 NRL MEMO Rep. 1744 UNCLASSIFIED
Naval Res. Lab., Washington, D.C., U.S.A. UNLIMITED
ANALYSIS OF THE STRESS-CORROSION CRACKING OF
Ti-6Al-4V FUEL TANK MATERIAL IN METHYL ALCOHOL 669.295.5'71'292
Moyn, D.A., Dahlberg, E.P., et al. 620.194.2
Jan., 1967 19pp.,6ref. 547.261

Material from a high 0.2% proof stress 6Al-4V titanium alloy space vehicle fuel tank was found to be susceptible to stress-corrosion cracking in methyl alcohol by an unidentified cleavage mechanism. Cracks propagated in contact with methanol at plane strain stress intensities as low as 15,000 $lb/in^2\sqrt{in}$. The same material was found to be somewhat susceptible to cracking in distilled water, by the same mechanism with a crack propagating at a plane strain stress intensity of about 30,000 $lb/in^2\sqrt{in}$.

GMH

P 148601 AECL-2668 UNCLASSIFIED
Atomic Energy of Canada Ltd., UNLIMITED
Chalk River, Ontario, Canada
THE USE OF ELECTRICAL METHODS FOR INVESTIGATING 669.296.5
THE GROWTH AND BREAKDOWN OF OXIDE FILMS ON 620.193.54
ZIRCONIUM ALLOYS
Cox, B.
Jan., 1967 58pp.,26ref.

As part of a wider programme for studying the morphology of oxide films on zirconium alloys, methods have been developed for characterising the distribution and dimensions of holes in the oxide large enough to permit molecular flow. The methods studied have been based on the following techniques. Firstly, following the change of impedance with time of immersion in an aqueous electrolyte, and comparing the results with measurements made with liquid metal or evaporated metal contacts. Secondly, developing a mercury porosimeter in which the applied pressure can be related to the dimensions of the hole that the mercury enters. From this the spectrum of cracks and pores in a given oxide film can be determined.

GMH

P 148859 CCL 230 (FR) UNCLASSIFIED
Aberdeen Proving Ground, Coating & UNLIMITED
Chemical Lab., Md., U.S.A.
A STUDY OF THE OPERATING LIMITS OF THE 669.686.5
STANNATE IMMERSION BATH 621.793.16
Deaver, W.H.
May, 1967 9pp.,2ref.

A study was conducted to determine the operating limits of the stannate immersion process for minimizing galvanic corrosion of magnesium-steel couples. Salt spray tests on specimens treated and then painted indicated that 100 sq. feet of work containing up to 22% steel could be safely processed per gallon of bath before substandard coatings were produced. Magnesium-steel couples containing more than 22% steel would not receive a satisfactory stannate coating.

GMH

P 148995 PR AD 253 155 UNCLASSIFIED
Massachusetts Inst. of Tech., UNLIMITED
Metallurgy Dept., Cambridge, U.S.A.
RESEARCH ON PARAMETERS INFLUENCING FLUIDITY IN 669.71513
ALUMINUM BASE ALLOYS 621.746.01
1.7.1960 99pp.,40ref. DA-19-020-507-ORD-4503

Using the vacuum fluidity test, a study was conducted on effects of additives on aluminium - 4.5% copper alloy. Elements added were titanium, iron, manganese, cobalt, chromium, beryllium, silicon, magnesium, calcium, and copper. Effect of vibration on fluidity was also examined briefly. Using the sand mould fluidity test, a study was made of effects of mould variables on fluidity of aluminium - 4.5% copper alloy. Variables examined included grain size, moisture content, type of sand (silica or zircon), type of bond (clay, sodium silicate, linseed oil, etc.) and additives (cereal, sawdust). Effects of mould coatings on mechanical properties of aluminium castings were studied (in a thin plate test pattern).

GMH

AD 645837 E910456-3 BI Mthly PR 3 UNCLASSIFIED
United Aircraft Corp., Res. Lab., UNLIMITED
East Hartford, Conn., U.S.A.
AN INVESTIGATION OF COMPOSITE METAL- 669.725-426
GLASS FIBERS (10.8 - 9.10.1966) 666.189.2
Cox, J.E., Veltri, R.D. 669.056.93
4.11.1966 6pp.,1ref. NOW-66-0198.d

An investigation was made of a continuous process for the production of metallic filaments by the application of a glass fibre forming technique wherein a metallic filament is formed as a core material in a metal-glass coaxial composite fibre. The work thus far has been limited to the investigation of beryllium as the core metal. Attempts were made to produce beryllium core fibres by the dual furnace technique, but results thus far have been negative due to premature fibre failure.

GMH

MISCELLANEOUS

AD 622387 FTD-TT 65-1150 UNCLASSIFIED
Foreign Tech. Div., Wright Patterson AFB., UNLIMITED
Ohio, U.S.A.
CAN A MACHINE CREATE A DESIGN (Transl. from: 007
MOSKOVSKAYA PRAVDA, JULY 5, 1962. p.2, U.S.S.R.) 72
Sinyakov, Yu. 681.3.01
23.9.1965 4pp.

Architecture is based on comfort, necessity and beauty. If the possibilities in keeping with these three based on harmonic proportions can be produced by a computer programmed with the architect's knowledge, experience taste and architectural age, then, this far, the machine creates the design.

VJB

P 149064 UNCLASSIFIED
Army Aviation Material Labs., UNLIMITED
Fort Eustis, Va., U.S.A.
RDTE TECHNICAL REPORTS PUBLISHED IN 1966 012
April, 1967 46pp.

UKSM Rep. 67/23 OPEN DISTRIBUTION
United Kingdom Scientific Mission,
Washington, D.C., U.S.A. 061.3"3.1967"
NEW HORIZONS IN SCIENCE AND ENGINEERING 53
Bourne, H.K.
April, 1967 12pp.

During the 1967 I.E.E.E. Convention in New York, a symposium was held in which a number of well-known speakers described the developments they expected to see during the 1970's in the fields of physics, quantum electronics and chemistry, and in communications, television and broadcasting, and microelectronics and space research. The opportunities which computers can offer to society were also discussed.

VJB

UKSM Rep.67/25 OPEN DISTRIBUTION
United Kingdom Scientific Mission,
Washington, D.C., U.S.A. 551.46
EXPLOITATION OF THE WORLD'S OCEANS 061.3"3.1967"
Bourne, H.K.
May, 1967 6pp.,5ref.

Summarises some of the developments which may be expected in the exploitation of the resources of the sea and shows the part which electronics engineers have to play in this.

VJB

P 148951 RR 120 UNCLASSIFIED
Army Cold Regions Res. & Engineering Lab., UNLIMITED
Hanover, N.H., U.S.A.
STRESS AND WAVE PATTERNS IN SOILS SUBJECTED TO DYNAMIC LOADS 624.131.5
Bernhard, R.K.
March, 1967 52pp.,44ref.

The report is in four parts: Parts I and II cover investigations of the reliability of shear stress measurements in soils subjected to vibratory loads for biaxial and triaxial systems. Part III is a study of three-dimensional "principal" stress patterns produced in soil subjected to vibratory loads. Part IV is a theoretical analysis of some aspects of soil wave propagation in stratified soil. From the measurements of five shear stresses and one normal stress, the stress distribution of a triaxial system can be determined. In noncohesive soils triaxial stress fields due to vibratory loads can be determined by recording six independent stress components. Sinusoidal force excitation and impact excitation yield time-distance graphs which can be used to determine reflection and refraction techniques in stratified soils.

GEP

P 148622 Handbook H51 UNCLASSIFIED
Office of the Assistant Secretary of Defense, UNLIMITED
Washington, D.C., U.S.A.
EVALUATION OF A CONTRACTOR'S INSPECTION SYSTEM 658.562
QUALITY AND RELIABILITY ASSURANCE HANDBOOK 355.02
3.1.1967 19pp.

Provides guidance for evaluation of contractors' inspection systems established in accordance with MIL-I-45208A, "Inspection System Requirements". The latter requires the contractor to design and maintain an inspection system that provides for all necessary inspections of the product including, where required, inspections at all stages of the manufacturing process as well as examination and testing of the finished product. Chapters deal with:- inspection system applicability and compatibility; contractor controlled manufacturing requirements; government controlled manufacturing requirements; requirements for purchases; and uses in ordering.

EHR