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SCIENTIFIC INFORMATION REPORT

Physics and Mathematics

(28)

Summary No. 4579   10 May 1963

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SCIENTIFIC INFORMATION REPORT

Physics and Mathematics (28)

This is a serialized report consisting of unevaluated information prepared as abstracts, summaries, and translations from recent publications of the Sino-Soviet Bloc countries. It is issued in seven series. Of these, five, Biology and Medicine, Electronics and Engineering, Chemistry and Metallurgy, Physics and Mathematics, and Organization and Administration of Soviet Science, are issued monthly. The sixth series, Chinese Science, is issued twice monthly; and the seventh series, Outer Mongolia, is issued sporadically. Individual items are unclassified unless otherwise indicated.

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I. PHYSICS

Atomic and Nuclear Physics

1. Radiation Formation of Electron-Positron Pairs

"Contribution to the Theory of Radiation Formation of Electron-Positron Pairs on a Nucleus," by N. F. Nelipa, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 148, No 1, Jan/Feb 63, pp 68-70

The goal of this article is to find a general expression for the differential cross section of the process γ + nucleus $\rightarrow$ recoil nucleus + $e^+ e^-$ + γ ' in the first nonvanishing approximation of the perturbation theory (by order of magnitude, it is $\sim$ 1/137 of the cross section for the formation of pairs).

2. Meson-Nucleon Vertex Portion and Pseudoscalar Mesons

"Analytical Properties of the Meson-Nucleon Vertex Portion and of the Scattering Amplitude of Pseudoscalar Mesons in the Perturbation Theory," by M. A. Mestvirishvili and I. T. Todorov, Joint Institute for Nuclear Research; Moscow, Doklady Akademii Nauk SSSR, Vol 148, No 3, Jan 63, pp 562-565

The summation of the diagrams with regard to the pseudoscalar nature of π mesons is considered. Physical primitive diagrams are found for the meson-nucleon vertex portion and for the scattering amplitude of a meson on a meson, and the corresponding regions are determined analytically.

3. Rotational States for Odd Nuclei

"Theory of Rotational States for Odd Nuclei With Small Nonaxiality, by Sh. Sharipov; Moscow, Vestnik Moskovskago Universiteta, Seriya III, Fizika, Astronomiya, No 1, 1963, pp 38-42

The dependence of the energy spectrum for the excited states of odd nuclei having in the ground state spins of 5/2 and 7/2 on the ratio of the rotational energy to the energy of "external nucleon" bond with the non-spherical part of the potential for the core of the nucleus is calculated.

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4. Polarization in Direct Nuclear Reactions

"Polarization of Nuclei in Direct Nuclear Reactions Taking into Account the Spin-Orbit Interaction," by V. F. Kharchenko, Khar'kov State University imeni A. M. Gorkiy; Kiev, Ukrains'kyy Fizychnyy Zhurnal, Vol 7, No 1, Jan 63, pp 11-16

General formulas allowing for the spin-orbit interaction were obtained for the angular distribution and polarization of escaping particles and final nuclei in direct nuclear reactions ·with transfer of the angular moment (stripping reaction and capture of particles, inelastic scattering of particles) if the incident particles and the initial nuclei are polarized. A relationship is established between the angular distributions in such reactions with polarized and unpolarized initial nuclei and polarization of nuclei.

5. Device To Measure the Life of a Nucleus

"In Billionths of a Second"; Kiev, Pravda Ukrainy, 20 Feb 63, p 1

Is it possible to measure the extremely short "life" of an excited nucleus which lasts several billionths of a second? Latvian sceintists have, in practice demonstrated such a possibility. An instrument intended for this was designed and put into operation in the Institute of Physics, Academy of Sciences Latvian SSR. The data obtained with it are of great interest to science, since it makes it possible to determine exactly the shape and other important characteristics of the nucleus. The apparatus consists of ten units.

Such high sensitivity is provided by a special electronic device. It detects gamma-radiation, emitted by the nucleus in the initial and in the final excited state, and converts it into electrical pulses. These signals are recorded in the form of a curve.

6. Two Soviet Physicists at Geneva

"Dubna Collaborates With Geneva"; Moscow, Leninskoye Znamya, 18 Dec 62, p 2

B. M. Barbashev, candidate of physicomathematical sciences, working in the laboratory of theoretical physics on quantum field theory, and N. M. Viryasov, working in the high energy laboratory and investigating "strange particles" on the proton synchrotron with a propane chamber, both from the Joint Institute for Nuclear Research at Dubna, have left recently to work in Geneva for 6 months, under the exchange agreement with the European Organization for Nuclear Research (CERN).

7. Angular Scattering of Particles in Cascade for Small Angles

"Functions for Angular Scattering of Particles in a Cascade Shower for Small Angles," by V. V. Guzhavin, Scientific-Research Institute of Nuclear Physics (NIIYaF); Moscow, Vestnik Moskovskogo Universiteta. Seriya III: Fizika, Astronomiya, No 4, Jul/Aug 62, pp 60-64

For small angles, functions of angular distribution of electrons and photons in a cascade shower are obtained for any stage of its development, taking into account multiple and single scattering. Ionization loss of cascading particles is not taken into consideration.

Submitted for editing on 11 December 1961.

8. Low Energy of ππ-Scattering

"Some Observations on Low Energy ππ-Scattering," by N. B. Pivovarova, Institute of Mathematics and Computer Center, Siberian Department, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 44, No 1, Jan 63, pp 383-385

Recently the equations for the low energy scattering of π mesons have been solved numerically by many. Among the solutions are those obtained by G. F. Chew and S. Mandelstam (Phys. Rev., Vol 119, 1960, p 467) with A_0 and A_1 wave resonances (waves with $I = S = 0$ and $I = S = 1$).

P-wave resonance is due completely to the large A_0 wave. In the absence of A_0 wave resonance, there is no solution with p-wave, which satisfies the threshold condition $A_1 (v)_{v=0} = 0$. For the width of p resonance, there exists an upper boundary at 50 Mev which is connected with the saturation of the A_0 wave. The equations of Chew-Mandelstam for the s and p waves have been solved by a number of authors. It was necessary to construct cut offs of the left, nonphysical sections to obtain p wave resnance in these equations. It is to be noted that the cut off of the left section is either constructed very far ($\Lambda = 10^8$) or the left section is replaced by the pole $v = -10^3$. Solutions with only a p wave resonance which is due to the "bootstrap" mechanism are found. It is shown that such resonance is determined by the contribution of the distant singularities of the left section.

9. <u>Energy Matrix in the System of Identical Particles</u>

"Calculation of the Energy Matrix of a System of Identical
Particles Situated in a State With a Given Spin," by I. G.
Kaplan, Physicochemical Institute imeni L. Ya. Karpov; Moscow,
<u>Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki</u>, Vol 44,
No 1, Jan 63, pp 382-383

It is stated in this article that the transformed matrices for the
permutation group necessary to compute the matrix elements of a two-shell
configuration were tabulated for all possible symmetries of the system
with a total, number of particles from 3 to 6. The second part of the
tables contains matrices for the permutation groups which enter into the
expressions for the matrix elements of the operator of two-particle inter-
actions for G in the systems which are located in the field of arbitrary
symmetry when the angular momentum is not preserved.

10. <u>π Meson Production in π^-p Collisions</u>

"Multiple π-Meson Production in.7.2-Bev π^-p Collisions," by
M. S. Aynutdinov, et al., Institute of Theoretical and Experi-
mental Physics; Moscow, <u>Zhurnal Experimental'noy i Teoreticheskoy
Fiziki</u>, Vol 44, No 2, Feb 63, pp 413-420

Multiple production of π mesons in π^-p collisions is investigated for
7.2-Bev primary π-meson energies. The measurements are performed with a
liquid hydrogen bubble chamber of 25 cm diameter. Angular and momentum
distributions of mesons and protons are presented for stars of different
multiplicities. The existence of bound states with energies above one Bev
is investigated for three and four mesons systems.

11. <u>Excitation Level in the Si^{30} Nucleus</u>

"Nature of the 3.79-Mev Excitation Energy Level in the Si^{30} Nucleus,"
by M. I. Guseva et al.; Moscow, <u>Zhurnal Eksperimental'noy i Teoretiche-
skoy Fiziki</u>, Vol 44, No 2, Feb 63, pp 421-423

A multiangle magnetic analyzer is used to study the energy spectra and
angular distributions of protons from the reaction Si^{29}(d, p)Si^{30} with Si^{30}
in the ground state and also at levels with excitation energies of 3.79 and
8.09 + 8.149 Mev. The spins, parities, and relative rediced widths of these
states are determined.

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12. μ-Meson Groups Near Atmospheric Showers

"μ-Meson Groups Near the Axis of Broad Atmospheric Showers,"
by Yu. N. Vavilov, G. I. Pugacheva, and V. M. Fedorov, Physics
Institute imeni P. N. Lebedev, Academy of Sciences USSR; Moscow,
Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 44, No 2,
Feb 63, pp 487-492

The results of a search for narrow groups of μ mesons near the axis of
broad atmospheric showers with a number of particles $10^3 \leq N \leq 10^5$ are
presented. It is shown that if μ-meson groups with a diameter $\leq$ 8 cm do
exist, their frequency of appearance is at least one seventieth of the
frequency according to S. N. Vernov et al. (ZhETF, Vol 37, 1959, p 1193)
and S. N. Vernov et al. (ZhETF, Vol 39, 1960, p 510). Data are presented
which indicate that there is no genetic relation between μ mesons moving
at distances $\leq$ 0.3 m from each other.

13. Renormalized Strong Interaction Theories

"Inelastic Interactions of High Energy Particles in Renormalized
Strong Interaction Theories," by I. F. Ginzburg, Institute of Mathe-
matics and Computer Center, Siberian Department, Academy of Sciences
USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki,
Vol 44, No 2, Feb 63, pp 500-513

The expansion of the Green functions and differential cross sections for
inelastic processes in a series based on the inverse value of energy 1/s is
found in renormalized theories. In some cases, the first terms of the series
are the usual peripheral diagrams, whereas in other cases they are somewhat
more complicated. The region of applicability of the results obtained is
much larger than that for the usual pole theory of peripheral collisions.

14. Parameters of the Diffraction Model of the Nucleus

"Determination of the Parameters of the Generalized Diffraction Model of the Nucleus at 660 Mev," by L. S. Azhgirey and S. B. Nurushev, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 44, No 2, Feb 63, pp 536-540

A relation between the nuclear scattering amplitudes and the parameters of the generalized diffraction theory for scattering of high energy particles on atomic nuclei as developed by K. R. Greider and A. E. Glassgold (Ann. Phys, Vol 10, 1960, p 100) is established by taking into account the spin-orbit interaction. The parameters of the generalized diffraction model are determined from the values of the amplitudes for scattering of protons on carbon nuclei. The spin effects are discussed.

15. Photon Scattering in the Coulomb Field

"Theory of Photon Scattering in the Coulomb Field of a Nucleus in the high-frequency range," by S. S. Sannikov, Physicotechnical Institute, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 44, No 2, Feb 63, pp 728-734

Elastic scattering of photons in a nuclear Coulomb field at high frequencies $\omega \gg m$ (m is the electron mass and ω the frequency of the incident photon) and large scattering angles $\theta \gg m/\omega$ are investigated by the method of dispersion relations. The main contribution to the cross section in the angle range indicated is from the real part of the scattering amplitude (whereas for small angel scattering, the main contribution is from the imaginary part of the amplitude). An expression is found for the differential cross section for scattering at angles $\theta \gg m/\omega$.

16. Paramagnetic Counter

"Paramagnetic Counter for Elementary Particles," by U. Kh. Kopvillem and B. M. Khabibullin, Physicotechnical Institute, Kazan' Affiliate, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 44, No 2, Feb 63, pp 749-752

The prospect for using paramagnetic crystals in the study of the magnetic properties of elementary and the detection of their presence by magnetic interaction with a counter is investigated. The effectiveness and the sensitivity of the neutron paramagnetic counter are estimated as an example.

17. High Energy Neutrinos

"Interpretation of an Experiment on High Energy Neutrinos,"
by L. I. Lapidus, Joint Institute for Nuclear Research;
Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki,
Vol 44, No 2, Feb 63, pp 755-758

Within the framework of the single neutrino hypothesis, it is possible to have an excess of muons over electrons; and for a more accurate solution of the problem of muon and electron neutrinos, it is necessary to have additional experiments.

18. Infrared Properties and Regge Trajectory

"Infrared Properties and Regge Trajectory in Electrodynamics,"
by L. D. Solov'yev and O. A. Khrustalev, Joint Institute for
Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoretich-
eskoy Fiziki, Vol 44, No 2, Feb 63, pp 758-760

The corollary of the dispersion relation obtained earlier by L. D. Soloy'yev (ZhETF, Vol 44, 1963, p 306) for the photon-electron scattering on the Regge trajectory in electron-positron interaction is examined, as well as the generalization of this corollary for particles of unequal masses.

19. Two-Electron Spark Chamber

"Two-Electron Spark Chamber With a Large Discharge Gap in a
Magnetic Field," by A. I. Alikhanyan, T. L. Asatiani, and E. M.
Matevosyan, Physics Institute, State Committee for Atomic
Energy; Moscow, Zhurnal Eksperimental'noy i Teorteticheskoy
Fiziki, Vol 44, No 2, Feb 63, pp 773-775

Preliminary results are given of an investigation on the possibility of recording the trajectory of charged particles in a spark chamber with a large discharge gap placed in a magnetic field. The exterior view of the chamber, installed in a gap of the electromagnet of the high altitude cosmic station at Nor Amberd, Institute of Physics, State Committee for Atomic Energy, is given in a photograph.

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20. Nuclear Reactor of the Georgan Academy of Sciences

"Atom in the Service of Peace," by L. Tsilosani; Tbilisi, Zarya Vostoka, 6 Nov 62, p 3

A review of the work done recently on the nuclear reactor of the Institute of Physics, Academy of Sciences Georgian SSR, was given by Eng Guram Karumidze. About 50 operations, many of which were recognized abroad, as well as in the USSR, have been conducted over the past 3 years.

A neutron diffraction camera was created by Georgian physicists in collaboration with the Tbilisis Machine-Tool Plant imeni S. M. Kirov. The problem of low-temperature polymorphism in metals is studied with this apparatus. Another instrument is to obtain pure gamma radiation, the so-called radiation loop.

A flow type instrument is for the study of the problem of the radiative cracking of hydrocarbons. Georgian physicists, together with scientists from the institute of Petrochemical Synthesis, Academy of Sciences USSR, and the Institute of Petrochemical Processes, Academy of Sciences Azerbaydzhan SSR, conducted investigations on the cracking of oil by irradiation. The output of unsaturated hydrocarbons, which is the raw material for producing polymers, is increased by radiative thermal cracking.

The work to be performed on the reactor in the near future will be of practical application to industry, especially in radiative cracking. For example, recently in achieving an increase in the life of automobile tires, scientists from Moscow irradiated them here and studied the vulcanizing of the rubber.

There is also an instrument to obtain polarized neutrons. The physicists working on this were able to obtain polarized neutrons with a very high degree of polarization. With this, it will be possible to know the structure of the atom.

Two additional buildings are being added. One will be a laboratory for radiative chemistry; the other, a radiochemical laboratory for the production of short-lived isotopes. Radioisotopes have wide practical application in industry, particularly in measurement techniques. The radioisotope measurement technique was widely developed here. The radiochemical laboratory will supply radioactive isotopes to all the institutes in need of them.

Among the scientists headed by Elefter Luarsabovich Andronikashvili are G. Karumidze, G. Garsevanishvili, Sh. Abramidze, M. Tsulaya, A. Mandzhavidze, G. Kikhadze, and B. Chikobava.

21. New Radiation Meter Manufactured in Hungary

Budapest, Muszaki Elet, 28 Mar 63, p 7

The new member of the Gamma nuclear instrument family is the small size complete analyzer. This can be well used for measurements where there must be a selective indication of the presence of radiation sources of small intensity and various powers. Such tasks often appear in medical diagnostics, geology, agriculture, and industry isotope laboratories. The instrument provides stabilized voltages between 300 and 2,000 volts for a Geiger Muller tube or scintillation head. Its broad band amplifier provides amplifications of 10,20, 50, 100 times. Its integral and differential discriminator operates in a range of 5-50 volts. Its six decade, decatron counter has a resolution of 5 microseconds. The timer gives automatic countings after time periods which can be set in 12 stages from one to 8,000 seconds. A similar circuit adjusts the time measurement after 10^3, 10^4, 10^5, or 10^6 impulses. Due to its new type discriminator adjustment and its remote control possibilities, the instrument is especially suitable for operation by nonprofessionals.

Plasma Physics

22. Standing Waves in Bounded Plasma

"A Theory of Standing Waves in a Bounded Plasma," by R. Leven, Chair of General Physics; Moscow, Vestnik Moskovskogo Universiteta. Seriya III: Fizika, Astronomiya, No 4, Jul Aug 62, pp 30-39

A dispersion equation is derived for standing weaves in a bounded plasma disturbed by two counter electron beams. A region of instability for such a system is found which depends on the velocity and density of the electrons in the beams for a given electron concentration in the basic plasma. A nonlinear approximation is found for the amplitude of the standing waves which are disturbed near the boundary of the region of instability.

23. Plasmoids

"Investigation of Plasmoids by Means of a Thermocouple," by I.
I. Demidenko, N. I. Mitina, and V. G. Padalka, Pysicotechnical
Institute, Academy of Sciences Ukrainian SSR; Kiev, Ukrains'kyy
Fizychnyy Zhurnal, Vol 7, No 1, Jan 63, pp 61-64

A method is developed for preparing highly senotive and low inertial
free bismuth-silver thermocouples by the method of vaccum evaporation.
The thermocouple was used to conduct an investigation of plasmoids formed
by a Bostick source. The studies were carried with and without a longi-
tudinal magnetic field. The velocity of the plasmoids is estimated.

24. Strong Focusing for Stabilization of Discharges

"Method of Strong Focusing for the Stabilization of Straight
and Torodal Discharges," by M. L. Levin and M. S. Rabinovich;
Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 33, No 2, Feb 63,
pp 164-172

A simple method is developed to investigate long-wave movements of
fine current pinches in external fields which are based on the Lagrangian
formalism for analytical mechanics. The dynamic stabilization of plasma
rings proposed by S. M. is examined using this method.

25. Equilibrium State of a Ring Pinch

"Problem on Equilibrium State of a Ring Pinch," by V. D. Shaf-
ranov; Leningrad, Zhurnal Tekhnickeskoy Fiziki, Vol 33, No 2,
Feb 63, pp 137-144

Yu. V. Vandakurov (ZhTF, Vol 30, 1960, p 1134; Vol 31, 1961, p 907)
examined the solution of equations for magnetic hydrodynamics which des-
cribe the equilibrium state of a fine toroidal ring with ferrite electro-
conductivity. In addition, he arrived at the conclusion that the station-
ary state does not exist; the pinch travels in a direction from the axis
of symmetry, and this, according to Vandakurov, leads to those anomalous
losses cf the particles from the plasma which were observed in experiments
on the stellarator and the tokamak.

The goal of this article is to show that the stationary solution
examined by Yu. V. Vandakurov does exist.

26. Noises in a Plasma and Instabilities in a Magnetic Field

"Noises in a Gas Discharged Plasma and Instabilites of a Plasma Column in a Longitudinal Magnetic Field," by A. R. Akhmedov and A. A. Zaytsev, Moscow State University; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 33, No 2, Feb 63, pp 177-182

Date on an experimental investigation of the spectrum of noises for a plasma in a longitudinal magnetic field are given. The results of measuring the frequency of rotation for a helical positive column with the results of the theory. The values of the critical magnetic field measure for the appearance of instability in the positive column are in accord with the laws of similarity.

27. Measurements on the Al'fa

"Spectroscopic Measurement of Electron Temperature on the Al'fa," by A. N. Zaydel', G. M. Malyshev, and Ye. A. Ptit-syna, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 33, No 2, Feb 63, pp 200-204

With regard to the intensity of the spectral lines for alloys, the electron temperature of the plasma is determined on the Alpha installation. The temperature measured by such a method is increased with a rise in the degree of ionization of ions by which it is determined. The limit of the measurement of the electron temperature is from 2 to 13 ev.

28. Interaction of an Electron Beam With a Plasma

"Interaction of an Electron Beam With a Plasma," by M. F. Gorbatenko, Physicotechnical Institute, Academy of Sciences Ukrainian SSR; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 33, No 2, Feb 63, pp 173-176

The interaction of a bounded electron ion beam with bounded anisotropy of the electron ion plasma is examined. Amplification factors are found in the limiting case $\lambda_\perp \gg b, b > a$ (a is the radius of the beam, b is the radius of the plasma, $\lambda_\perp$ is the transverse wave length in the system divided by 2π).

29. Nonequilibrium Plasma

"Thermomagnetic Waves and Excitation of a Magnetic Field in a Nonequilibrium Plasma," by L. E. Gurevich, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 44, No 2, Feb 63, pp 548-555

It is shown that in a plasma with a temperature gradient, magnetic fields arise during hydrodynamic motions which are capable of resonance acceleration of the electrons and ions. In a plasma of this type, a special type of thermomagnetic wave may exist; the Alfven wave splits into two waves with different frequencies, and the spectrum of the magnetoacoustic waves is modified.

30. **Turbulent Theory of a Rarefied Plasma**

"Turbulent Theory of a Weak Nonequilibrium Rarefied Plasma and the Structure of Shock Waves," by A. A. Galeyev and V. I. Karpman, Novosibirsk State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 44, No 2, Feb 63, pp 592-602

A kinetic equation is derived for interacting waves in a weak nonequilibrium rarefied plasma. The relation between the laminar and turbulent theories of shock waves "without collisions" in a strong magnetic field is discussed. An estimate of the turbulent width of shock waves is made on the basis of the kinetic equation.

Solid State Physics

31. **Kapitsa Associate Offers Approach to Development of New Laser Materials**

"Intramolecular Energy Transfer and Quantum Generators," by V. P. Bykov, Institute of Physical Problems, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'ny i Teoreticheskoy Fiziki, Vol 43, No 6, Dec 62, pp 2313-2315

The author suggests that the phenomenon of energy transfer in molecules of certain complex compounds, as shown by S. J. Weissman (J. Chem Phys, 10, 214, 1942) and confirmed by A. N. Sevchenko and A. K. Trofimov (ZHETF, 21, 220, 1951), using organic compounds of Europium and Samarium, enables an examination as laser materials of substances which have heretofore been considered poor prospects for such application.

Bykov remarks that there is at present no reason to support that this phenomenon is limited to rare-earth or organic-radical ions and that the use of the principle offers the possibility of producing lasers more efficient than ruby lasers and will also extend the range of wave lenghts which can be generated.

Bykov thanks P. L. Kapitsa for his attention to this matter.

3ᴸ. Semiconductivity in Glass

"Structure Investigation of Semiconducting Glass Based on
Iron Oxides," by G. O. Karapetyan, V. A. Tsekhomskiy, and
D. M. Yudin, State Optical Institute imeni S. I. Vavilov;
Leningrad, Fizika Tverdogo Tela, Vol 5, No 2, Feb 63,
pp 627-633

Oxygen containing glass of various compositions with constant
concentrations of ion oxides is investigated. The study of properties
was performed on the basis of data on electroconductivity, on optical
absorption spectra, and on electron paramagnetic resonance spectra.
An explanation is proposed for the electroconductivity of glas from
the point of view of its structure.

33. Boundary Line Equilibrium

"Thermodynamic Equilibrium on Division Line of Three Phases,"
by V. V. Voronkov, State Scientific-Research and Planning
Institute for the Rare Metals Industry; Leningrad, Fizika
Tverdogo Tela, Vol 5, No 2, Feb 63, pp 571-574

Conditions for thermodynamic equilibrium on the line of division
of the three phases of a substance are examined. Formulas are derived
for the angles between the surfaces of phase divJsion and for the dir-
ection of shift of the line of division during crystallization for the
line of division during crystallization for the various relations
between the coefficients of surface tension on the phase boundaries.
The properties of a liquid film forming on the surface of the solid
phase in the case of a complete wetting are considered.

34. Uniaxial Antiferromagnetic

"Magnetization Temperature Dependence of a Uniaxial Antifer-
romagnetic," by Yu. G. Rudoy, Moscow State University imeni
M. V. Lomonosov; Leningrad, Fizika Tverdogo Tela, Vol 5,
No 2, Feb 63, pp 534-541

A magnetic uniaxial antiferromagnetic with g-factor anisotropy and
interaction anisotropies is examined in the presence of an external field.
In this article, the anisotropy of the magnetic properties of a crystal
follows automatically from the anisotropy of the tensor of the exchange
interaction with respect to the crystallographic axes, which makes it
possible to investigate the dependence of magnetization on temperature
more consecutively and fully than in other works.

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35. Temperature Dependence in Semiconductors

"Temperature Dependence of Optical and Nonradiative Transitions in Semiconductors," by L. S. Kukushkin, Physicotechnical Institute of Low Temperatures, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 44, No 2, Feb 63, pp 703-709

A differential-difference equation for the probability of some optical and nonradiative transitions in semiconductors is given. The expression for $T = 0$ is taken as the "initial" function. In a number of cases, approximate solutions of the equation derived can be found. Under some assumptions, the equation turns into the diffusion equation and can be solved exactly. Thus, the method proposed makes it possible to construct the expression $J_W(E;T)$ on the basis of its value for $T = 0$.

36. Vibrations of a Crystal Lattice

"Effect of Vibrations of a Crystal Lattice on Internal Conversion," by S. I. Dudkin, Ukrainian Agricultural Academy; Kiev, Ukrains'kyy Fizychnyy Zhurnal, Vol 7, No 1, Jan 63, pp 74-80

The effect of vibrations of a crystal lattice on the probability of escape of conversion electrons and on the internal conversion ratio are considered. It is shown that the shape of the conversion line under the condition of high heat release is described basically by the factor

$$\frac{1}{2} B\sqrt{\pi} \exp\left[\frac{-(\varepsilon - E_n - E - A')^2}{4B^2}\right],$$

where B and A' are constants depending on the type of crystal, e is the nuclear transition energy, E is the conversion electron energy, and E_n is the energy of the converted bond in the atom. The value of the nuclear transition energy proves to be displaced by the value A' relative to the experimental value at the point of maximum probability.

37. Diffused p-n Junctions

"Problem of Impedance of Diffused p-n Junctions for a Small Variable Signal," by D. A. Aronov, Physicotechnoical Institute, Academy of Sciences Uzbek SSR; Tashkent, *Izvestiya Akademii Nauk UzSSR, Seriya Fiziko-Matematicheskikh Nauk,* No 6, 1962, pp 75-86

The characteristics of a diffused p-n junction with a finite base thickness is calculated for the case when a small harmonic signal is superimposed on the fixed back bias. Such a calculation was performed previously for sudden (meltback) p-n junctions of arbitrary structure with an unlimited base thickness. These investigations are used in explaining the effect of the region of variable concentration of impurity on the magnitude of the resistance and capacitance and on the nature of their frequency dependence.

38. Macroradicals in Polymers

"Macroradicals in Solid Polymers," by V. L. Levshin and P. A. Pipinis, Moscow State University imeni M. V. Lomonosov; Leningrad, *Fizika Tverdogo Tela,* Vol 5, No 2, Feb 63, pp 691-693

The problem here is to clarify how the electron emission of the ZnS crystal depends on the impurities introduced into a gas medium in which there is phosphor. If the electron emission is determined by capture centers, it must depend on the activator since many capture centers arise when an activator is introduced. If the emission is determined by the gas, then the location of the maximums and their interactions must be changed essentially by a change in the gas medium surrounding the phosphor.

39. Rare Earth Ions

"Magneto-optics of Rare Earth Ions in Ferromagnetic Crystals," by G. S. Krinchik, Moscow State University imeni M. V. Lomonosov; Leningrad, *Fizika Tverdogo Tela,* Vol %, No 2, Feb 63, pp 373-380

A quantitative calculation is given for the frequency dependence of the Faraday effect in europium ferrite-garnet produced by volumetric interaction between rare earth and iron sublattices of ferrite-garnet. The properties of the polarized spectra for the absorption and luminiscence of rare earth ions entering in the composition of the ferromagnetic crystal are analyzed under the hypothesis of cubic symmetry of the innercrystalline field. It is shown how, with the help of an external magnetic field, it is possible to control the spectrum of rare earth ions in ferromagnetics, which is proposed to be used in making a controlled laser on a ferromagnetic crystal.

40. Local Electron Centers in Semiconductors

"Theory of Local Electron Centers Near the Surface of a Sem-
iconductor," by M. D. Glinchuk and M. F. Deygen, Institute
of Semiconductors Academy of Sciences Ukrainian SSR; Lenin-
grad, Fizika Tverdogo Tela, Vol 5, No 2, Feb 63, pp 405-416

The wave function and the energy of the ground state are calculated
for the local electron center near the surface of a crystal. The de-
pendence of the position of the Schroedinger term and the thermal dis-
sociation energy of the electron on the distance of the local electron
center from the surface determined. The red boundary of the external
photoeffect and the work function of the localized electron on the sur-
face are computed. The shift of the g-factor (Δg) and the dependence
of Δg on the orientation of the crystal in an external static magnetic
field are obtained.

41. Functional Methods Applied to Electron Movement

"Application of Functional Methods to the Problem of
Electron Movement in Solids With Point Defects," by
R. A. Suris; Leningrad, Fizika Tverdogo Tela, Vol 5,
No 2, Feb 63, pp 458-468

Properties of the behavior of charge carriers in a solid with
point defects are studied. Exact equations are obtained in functional
derivatives for n-partial Fermi functions of Green by the arbitrary
law for distribution of the impurity. Approximate equations are
obtained also for the Green funtions in the case of a sufficiently
small concentration of impurity and for uniform distribution. The
problem of impurity levels is examined as the simplest application
of the theory proposed.

42. Impact Recombination in Semiconductors

"Theory of Impact Recombination in Semiconductors
With Impurity Band," by N. S. Baryshev and Z. I.
Uritskiy, State Optical Institute imeni S. I.
Vavilov; Leningrad, Fizika Tverdogo Tela, Vol 5,
No 2, Feb 63, pp 478-480

Impact recombination is examined for nonequilibrium carriers in
semiconductros with an impurity zone of the donor type. Impurity
atoms are assumed to by hydrogenlike and to produce the proper sub-
lattice in a crystal. The probability of a transition in the absence
and in the presence of the degeneration of the electron gas in the zone
of conductivity is calculated. Furthermore, in the first case, the
connection between the lifetime and the concentrations is of the
form $\tau \sim \frac{1}{n^k}$ with k <2, and in the second case, τ increases with
n. The numberical estimates of the lifetime agree acceptably with
existing expermental data.

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43. Exciton Scattering on Phonons

"Theory of Scattering of Excitons on Phonons," by A. A. Demidenko, Institute of Semiconductors, Academy of Sciences Ukrainian SSR; Leningrad, Fizika Tverdogo Tela, Vol 5, No 2, Feb 62, pp 489-498

The probability of the scattering of excitons on phonons in a cubic crystal is calculated. It is shown that depending on the energy of the scattered exciton, the major contribution to the total probability may be accounted for by various terms in Hamiltonian. The scattering on acoustical phonos dominates at low temperatures.

44. Nuclear Magnetic Resonance Line

"Second Moment of Nuclear Magnetic Resonance Line for Spin $\frac{3}{2}$," by I. Biryukov and I. Berson, Institute of Organic Synthesis, Academy of Sciences Latvian SSR; Leningrad, Fizika Tverdogo Tela, Vol 5, No 2, Feb 63, pp 499-501

The second moment of the nuclear quadrupole resonance line is estimated for nuclei with spin $\frac{3}{2}$ in an internal electric field of axial symmetry under the assumption that the gradients of the field have a general direction.

45. Polycrystalline Ferroelectrics

"Investigation of Mechanical Nonlinearity for a Number of Polycrystalline Ferroelectrics," by G. A. Velyuk- hanova et al.; Leningrad, Fizika Tverdogo Tela, Vol 5, No 2, Feb 63, pp 506-512

Mechanical properties of five polycrystalline ferrolectrics are investigated. The method and the results of the measurement are given for the dependence of the real and the imaginary components of the dynamic Young's modulus on the amplitude of the mechanical voltage. The dependences obtained are compared to the results of an investigation of the dielectric constant and the dielectric loss in strong electric fields.

46. Extrinsic Photoconductivity

"Temperature Effect on Kinetics of Extrinsic Photo-
conductivity in n-type Ge With Gold Impurity," by
N. G. Zhdanova and V. G. Alekseyeva, Institute of
Radio Engineering and Electronics, Academy of
Sciences USSR; Leningrad, Fizika Tverdogo Tela,
Vol 5, No 2, Feb 63, pp 546-551

The kinetics of impurity photoconductivity in germanium is
investigated during the ionization by light of 0.20 ev gold com-
pensated level at temperatures of 55-170°K. It is possible to
expand the curve of the photoconductivity loss into two exponents
with strongly varied time constants one of which is connected
with the gold and the other determined by extraneous centers.
It is found that the coefficient of electron capture by singly
charged negative gold ions increases slightly during a temperature
rise and that this dependence may be coordinated with the law
$\exp\left(-\frac{T}{T_0}\right)^{1/3}$. The magnitude of the capture coefficient at
$77°K$ was found to be 7×10^{-11} $cm^3 \times sec^{-1}$.

47. Semiconductor Parameters

"Determination of Semiconductor Parameters From
the Photomagnetic Effect and Photoconductivity,"
by V. K. Subashiyev, Institute of Semiconductors,
Academy of Sciences USSR; Leningrad, Fizika Tver-
dogo Tela, Vol 5, No 2, pp 556-558

Substantiated is a certain improved variation of the method of
determining the parameters of a homogeneous semicondutor from the
spectral characteristics of photoconductivity and photomagnetic
effect.

48. Trapping Levels in Selenium

"Trapping Levels in Amorphous Selenium Treated by
Mercury," by M. I. Korsunskiy and N. S. Pastushuk,
Khar'kov Polytechnic Institute imeni V. I. Lenin;
Leningrad, Fizika Tverdogo Tela, Vol 5, No 2, Feb 63,
pp 559-563

It is determined that in an amorphous selenium with a mercury
impurity, the relaxation curves have S-shapes similar to the relaxa-
tion curves of monopolar photoconductivity in CdS single crystals
observed by L. G. Paritskiy and S. M. Ruvkin (FTT, 3, 1961,
p 8; FTT, 2, 1960, p 3). This indicates the presence of trapping
levels in amorphous selenium.

Applying the method for the theoretical examination of
relaxation curves of the increase of monopolar photoconductivity
proposed by Paritskiy and Ruvkin for the "nonlinear" charging of
trapping levels in CdS, an estimate is made of several parameters
characterizing the photoconductivity in amorphous selenium.

49. Crystal Lattice

"Thermodynamics of Crystal Lattice," by A. Ye.
Marinchuk and V. A. Moskalenko, Institute of Physics
and Mathematics, Academy of Sciences Moldavian SSR;
Leningrad, Fizika Tverdogo Tela, Vol 5, No 2, Feb 63,
pp 575-580

On the basis of the diagram technique, an expression is derived
for the thermodynamic potential Ψ of a homogeneous lattice, taking
into account the cubic and the quadruple anharmonics. The Dayson
equation for the polarized operator is obtained, and a variational
theorem for Ψ is established.

50. Fermi Levels in Semiconductors

"Position of Fermi Levels in Heavily Doped Semiconductors," by I. P. Zvyagin, Moscow State University imeni M. V. Lemonosov; Leningrad; Fizika Tverdogo Tela, Vol 5, No 2, Feb 63, pp 581-585

The effect of large impurity concentrations on the position of Fermi levels in semiconductors is examined. Corrections are made to the effective mass appearing in the density of the states due to interaction with the impurity and electron-electron interaction when $T = 0$. The examination is generalized in the case of a temperature other than zero. It is shown that in heavily doped semiconductors, the interaction of electrons between themselves is more substantial than the interaction with the impurity. The change in position of Fermi levels due to the interactions examined, as well as the change in decay temperature is calculated.

51. Energy Spectrum in Thin Films

"Some Effects Due to Discrete Nature of Electron Energy Spectrum in Thin Films," by B. A. Tavger and V. Ya. Demikhovskiy, Gorkiy State University imeni N. I. Lobachevskiy; Leningrad, Fizika Tverdogo Tela, Vol 5, No 2, Feb 63, pp 644-648

Some effects in films which are caused by the discrete nature of the electron energy spectrum are examined. It is noted that the electron states in films lie in the plane cross sections of the Brillouin Zone. In this connection, the statistics of electrons are examined and formulas are obtained for the Fermi level and the concentration of carriers, depending on the temperature. It is shown that at low temperatures the paramagnetic sensitivity in films may fluctuate with a change in the magnetic field.

52. Two-Quantum Transitions

"Theory of Two-Quantum Magnetcacoustical Transitions," by A. R. Kessel' and U. Kh. Kopvillem, Physicotechnical Institute, Kazan Affiliate, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 5, No 2, Feb 63, pp 667-674

A theory for the shapes of the lines for two-quantum transitions is given. An expression is obtained for the second moment with arbitrary transitions in a spectrum with degenerate levels due to arbitrary one- and two-particle interactions. Indicated is the possibility of excluding the contribution of dislocations, the resonance terms of the magnetic dipole interactions, and the isotopic exchange to the widths of the lines of acoustic absorption.

Mechanics

53. Contact Discontinuity

"Interaction of a Single Wave With Contact Discontinuity," by
Yu. A. Sozonenko; Moscow, Vestnik Moskovskogo Universiteta,
Seriya I, Matematika, Mekhanika, No 1, Jan/Feb 63, pp 54-61

The one-dimensional unsteady motion of a perfect, nonviscious, and nonthermal
conducting gas, caused by a discontinuity in the initial conditions, is
examined.

54. Nonlinear Problems of Structural Mechanics

"On Solution of Nonlinear Three-Deimensional Problems in Strucrural
Mechanics," by L. N. Stavraki (presented by F. P. Belyakin, member
of Academy of Sciences Ukrainian SSR); Kiev Dopovidi Akademii Nauk
Ukrains'koi RSR, No 12, 1962, pp 1591-1594

The author presents new nonlinear problems in calculation of deformation
and stability of arbitrary loaded three dimensionsl bar systems with solid
and thin-walled bars of variable cross section and taking shear into account.
A general numerical method is proposed for the solution of these problems,
which is a new modification of the method of succesive approximations with
accelerated convergence. Examples of calculations of columns, frames, and
trusses show that this methodrequires only two or three approximations with
accelerated convergence. Examples of calculations of columns, frames,
and trusses show that this method requires only two or three approximations.

55. Development of Cracks of Unequal Length

"On Development of Two Cracks of Unequal Length," by V. V. Panasyuk
and B. L. Lozovoy (presented by G. N. Savin, member of academy of
Sciences Ukrainian SSR); Kiev, Dopovidi Akademii Nauk Ukrains'koi
RSR, No 11, 1962, pp 1444-1447

A solution is given for the problem of the development of two unequal
cracks lying in a straight line in an elastic plate, when the plate is
stretched perpendicularly to theline of location of the cracks by constant
stresses. Limiting values of the external stresses at which the cracks begin
to increase (to develop) are calculated. The problem is solved on the
basis of N. I. Muskhelishvili's method (N. I. Muskhelishvili, Nekotoryye
Osnovnyye Zadachi Matematicheskoy Teorii Uprugosti [Some Basic Problems in
the Mathematical Theory of Elasticity], Izdatel'stvo AN SSSR, 1954).

56. **Determination of Amplitudes of Forced Oscillations**

"On Transition Through Fundamental Resonance Frequency of a
Cylindrical Shell," by L. A. Movsisyan (presented by S. A.
Ambartsumyan, Corresponding Member, Academy of Sciences Arminian
SSR, on 11 May 1962); Yerevan, Doklady Akademii Nauk Armyanskoy SSR,
Vol 35, No 3, 1962, pp 113-118

The object of this work was to determine amplitudes of forced oscillationt
by means of their reduction to the known tabulated function for the case when
the "frequency" of the perturbation force is a linear function of time.

Examined is a thin orthotropic shell, principal directions of elasticity
of material of which coincide with principal lines of the curvature. The
theory of shallow shells is used.

57. **Helical Dislocation**

"Helical Dislocation in Prismatic Rods," by M. Ya. Leonov and
N. Yu. Shvayko; Moscow, Inzhenernyy Zhurnal, Vol 2, No 4, 1962,
pp 293-302

The author investigates the tensely distorted condition produced by
helical dislocations in prismatic rods of certain cross sections. It is
shown that the dislocation function of stresses for a solid rod represents
to the last coefficient the Green's function constructed for the domain of
the cross section.

58. **Mechanism of Self-Exciting Field**

"On Mechanism of Self-Exciting Field by Flow of Conducting Fluid,"
by V. M. Kuznetsov; Moscow, Inzhenernyy Zhurnal, Vol 2, No 4,
1962, pp 217-226

Some problems associated with the model of a self-exciting plasma
generator are investigated. Regions and limits of the coefficient of self-
excitation are determined. The effect of ponderomotive force is taken into
account, and maximum attainable fields are evaluated. It is shown that in
a one-dimensional examination, the field does not change significantly along
the channel.

5. . Parameters of Nonstationary Flow in Gas Systems

"Boundary Condition for Nonstationary Processes in Gas System," by
R. A. Shiplov; Moscow, Inzhenernyy Zhurnal, Vol 2, No 4, 1962, pp 232-
236

The relation between parameters of nonstationary flow at the entry into
the air intake of a gas system is obtained. The reflection factor and the
correction for the open end in the presence of drift flow are calculated.

60. Melting Rate of Solid Body in Heat Flow

"Determination of Constant Melting Rate of Semi-Infinite Solid
Body," by Ye. M. Shakhov; Moscow, Inzhenernyy Zhurnal, Vol 2,
No 4, 1962, pp 237-244

The problem of determination of the constant rate of melting for a
semi-infinite body under constant heat flow and arbitrary initial conditions
is investigated. It is assumed that the melted substance has no effect on the
melting behavior (thin film). Asymptotic expressions for the rate of melting
and the rate of cooling in the body are obtained. The effect of sudden
change in the magnitude of heat flow on the rate of melting is analyzed.

61. Light Scattering Phenomenon in Fluid Flows

"Experimental Study of Light Scattering Phenomena in Laminar and
Turbulent Fluid Flows," by V. V. Struminskiy and V. M. Filippov;
Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh
Nauk, Mekhanika i Mashinostroyeniye,,No 6, Nov/Dec 62, pp 10-16

The results of the study of light scattering phenomena in laminar and
turbulent fluid flows are given.

Studied are some regularities of the change in intensity in light
scattering in relation to velocity and nature of the fluid flow.

It is established that the transition of the laminar flow into turbu-
lent flow causes a sharp change in constant (average with respect to time)
and pulse components of the scattered luminous flux. The constant compo-
nent changes with velocity increase in the region of precritical and
posticritical flow velocities. In the posticritical region, the frequency
spectrum of the pulse component of theluminous flux also changes with the
increase in velocity.

An ultramicroscope was also used in the study of the flow structure. The side-view measurements of average velocities for the laminar flow condition are cited.

62. Convective Heat Transfer for Free and Forced Flow Through Tubes

"Solution of a Problem on Superposition of Turbulent Forced and Free Heat Convection in a Vertical Tube With Internal Heat Sources in the Fluid," by L. E. Ber; Moscow, Izvestiya Akdemii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye No 6, Nov/Dec 62, pp 25-32

The problem of mixed (forced and free) turbulent convection in a vertical tube with uniformly distributed internal heat sources is solved. The first two approximations for velocity and temperature are computed using the three-layer arrangement of the turbulent flow; velocity and temperature curves are constructed for various parameter values. The influence of free convection on heat transfer is discussed.

63. Supersonic Flow Around Plates at Angles of Attack

"Supersonic Flow Around Plane Triangular Plate," by D. A. Mel'nikov Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye, No 6, Nov/Dec 62, pp 33-39

The author investigates the flow around the compression side of a plane triangular plate at angles of attack for which the supersonic velocity vector component of the undisturbed flow, normal to the leading edge of the plate, meets the plate at an angle smaller than the limiting angle of the wedge.

The results show that for small M_∞, the C_p, on an average, in the region of $\varphi = 0$ to φ^x is noticeably smaller than C_p for the flows with constant parameters at $\varphi = \varphi^x$ to φ (φ_- - value at leading edge). This difference decreases as M_∞ increases.

In general, the solution obtained compares facorably with the one obtained by numerical integration (L. R. Fowell, "Exact and Approximate Solution for Supersonic Delta Wing," IAS, 1956, No 8).

64. Blade Flutter in Aerodynamic Lattice

"Bending and Torsional Flutter of Blades in Dense Aerodynamic Lattice," by G. S. Samoylovich; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye No 6, Nov/Dec 62, pp 72-77

The author obtained a formula for determination of the field of velocities around the lattice of thin profiles which oscillate with arbitrary displacement phases. Formulas for critical rate of flutter for a special case of dense lattice without bearing out and displacement of phases are obtained; instability zones are determined.

65. Stability of Cylindricla Shell in Supersonic Flow

"Stability of Anisotropic Cylindrical Shell in Supersonic Gas Flow," by Zh. Ye. Bagdasaryan; Yerevan, Izvestiya Akademii Nauk Armyanskoy SSR, Seriya Fiziko-Matematicheskikh Nauk, Vol 15, No 6, 1962, pp 3-10

A circular cylindrical shell of infinite length and made of orthotropic material is studied in a supersonic compressible gas flow of nonperturbed velocity U directed along the longitudinal axis of the cylinder.

It was noted that the minimal critical velocity depends on the general directions of elasticity of the shell material.

Numberical examples and conclusions are made for angles at which the criticial maximum and minimum velocities occur.

66. Stability of Plastically Deformed Plates

"Stability of a Thick Plastically Deformed Plate," by I. D. Legenya (presented by Academician A. Yu. Ishlinskiy on 26 April 1962); Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 6, Dec 62, pp 1314-1317

According to L. S. Leybenzon (Sobr. Tr., 1, Izd. AN SSSR, 1951), the stability of thick-walled structures should be studied beginning with equations of the elastico-plastic state, In the work 'I. D. Legenya, DAN,

141, No 4, 1961), the loss of stability of a thick freely supported plate under the action of a compressible load was similarly examined, whereupon the relations of the theory of elastico-plastic deformations were used. In the present work, the author solves the same problem, utilizing equations of the theory of flow of an anisotropically hardening material.

It is necessary to note that the loss of stability is determined only by the shape of the curve $\sigma_z^0 \sim \mathcal{E}_z^0$ and that the nature of hardening (isotropic or anisotropic) in no way affects the value of critical loading.

67. Bending of Thick Three-Layer Plate

"Bending of Thick Three-Layer Plate," by A. P. Melkonyan; Yerevan, Izvestiya Akademii Nauk Armyanskoy SSR, Seriya Fiziko-Matematicheskikh Nauk, Vol 15, No 5, 1962, pp 41-57

The author investigates the problem of bending of a thick rectangular three-layer plate under an arbitrary transverse loading applied to the top. The layers possess different coefficirnts of elasticity. At the boundaries of each layer, the coefficient of elasticity is considered to be constant. It is assumed that the different materials composing the layers have identical Poisson coefficients.

68. Elastico-Plastic Bending of a Fixed Plate

"Bending of a Round Fixed Plate Beyond Elasticity
limits," by A. S. Grigor'yev; Moscow, Izvetiya
Akademii Nauk SSSR, Otdeleniye Tekhinicheskikh
Nauk, Mekhanika i Mashinostroyeniye, No 6, Nov/
Dec 62, pp 83-87

Generally, the primary interest in the solution of a problem
in elastico-plastic bending of a plate is the relation between
the loading and typical displacement, as well as the limits of
loading.

This article gives for the first time a complete solution
of the above problem.

69. Generalization of Irreversible Processes

"On Problem of Generalization of the Thermodynamics
of Irreversible Processes," by N. S. Akulov; Minsk,
Doklady Akademii Nauk BSSR, Vol 6, No 12, Dec 62,
pp 762-765

The classical thermodynamics of irreversible processes is
inadequate for solution of many important problems in modern
physics such as ferro-magnetism, theory of plasticity, ferro-
electricity, and others.

For extension of the generalized thermodynamics of irrever-
sible processes, generalization of relations of the type
$\frac{dq_i}{dt} = \sum_j L_{ij}x_j$ so as to make them applicable to nonhysteresis, as
well as hysteresis processes, is of particular importance. The
author shows that these more general relations must be of a
form $\dot{q}_i = \sum L_{ij}(x_j - x_{jcr}) + \sum M_{ij}\frac{dx_j}{dt}$ where $x_j \geq x_{jcr}$
This derivation may be obtained on the bases of the theory of
latent parameters.

70. Planar Problem of Dynamics in Theory of Elasticity

"The Solution of a Planar Problem of Dynamics in the
Theory of Elasticity by a Method of Fundamental Func-
tions," by T. Azhymudinov, Institute of Mathematics of
the Academy of Sciences of the Uzbek SSR; Tashkent,
Izvestiya Akademii Nauk Uzbekskoy SSR: Seriya
Fiziko-Matematicheskikh Nauk, No 5, 1962, pp 5-13

The article concerns the solution of a problem in the mathe-
matical theory of elasticity for the planar case by the method
of fundamental functions. The author makes use of Fredholm
integral equations.

71. Nonstable Solutions for Oscillatory Systems

"The Problem of Finding Nonstable Solutions for
Certain Oscillatroy Systems," by E. F. Faizi-
bayev, Institute of Mathematics, Academy of Sciences
Uzbek SSR; Tashkent, Izvestiya Akademii Nauk
Uzbekskoy SSR: Seriya Fiziko-Matematicheskikh
Nauk, No 5, 1962, pp 25-29

The simplest nonlinear, natural oscillatory system has an
equation of the form $\frac{d^2x}{dt^2} + k\frac{dx}{dt} + (\alpha + \gamma_1 x^2)x = \epsilon(\beta + \gamma_2 x^2)\frac{dx}{dt} + R \sin m\upsilon t$,
where $k > 0$ is the coefficient of friction; α, β, γ_1, γ_2 are
positive constants; m is an integer; t is time; ϵ is a small para-
meter; and R sin mυt is an external sinusoidal disturbing force.

In this article, the author obtains unstable solutions to
the above equation which take into account the higher harmonics.

72. Effect of a Solvent in Infrared Spectra of Molecules

"Effect of a Solvent on the Position and Intensity of the
Bonds in Infrared Spectra of Molecules," by O. P. Girin
and N. G. Bakhshiyev; Moscow, Uspekhi Fizicheskikh Nauk,
Vol 79, No 2, Feb 63, pp 235-262

The effect of a solvent on the spectral characteristics of molecules
in dissolved matter is of main interest in molecular physics since in
the majority of cases, the optical and other physical properties of
the molecules must be studied in solution. The molecule investigated
is, therefore, under the influence of the surrounding molecules in
the medium, the effect of which may lead to a substantial change in
its properties. The spectra observed in experiments are characterized
in this case, not by their molecules, but by the system "molecule-
medium investigated." It is quite clear that the study of this
problem is extremely important from a theoretical, as well as practical,
point of view.

This article, although incomplete in scope, attempts to examine
critically a number of basic papers concerning the latest trend in
this area. Greater attention is given to those papers whose authors
strove to generalize completely the experimental factors from a given
point of view.

73. Renormalization Group Method

"Renormalization Group Method in Quantum Electro-
dynamics," by V. V. Rozhkov and P. I. Fomin; Physico-
technical Institute, Academy of Sciences Ukrainian
SSR; Kiev, Ukrains'kyy Fizychnyy Zhurnal, Vol 7,
No 1, Jan 63, pp 26-30

Some questions connected with the renormalization group method
in quantum electrodynamics are discussed.

74. Concrete Creep

"Creep of Concrete Under Torsion," by K. S.
Karapatyan; Yerevan, Izvestiya Akademii Nauk
Armyanskoy SSR, Seriya Fiziko-Matematicheskikh
Nauk, Vol 15, No 6, 1962, pp 23-37

Very little is know about the effect time has on the strength
and deformation of concrete under torsion; yet it has both theoretical
and practical significance. It is well known that concrete under

prolonged loading has a creep property which accounts for its deformation with time exceeding that of elastically instantaneous deformation.

The objective of the present investigation is experimental determination of the applicability of the second and third prerequisites in the theory of elastic creeping bodies under torsion. As the result of the study, the following conclusions are made:

1. Torsional strength of the concrete is approximately 10% of the compressional strength.

2. Torsional strength of concrete is greater than tensional strength.

3. Duration of the test has a substantial effect on the strength and deformations of the concrete in torsion.

4. In case of instantaneous leoading, the relation between stresses and deformations of the concrete in torsion is linear.

5. The age of the concrete at the time of testing has a substantial influence on the law of deformation of the concrete under torsion.

6. Under identical stresses and other conditions, concrete creep under torsion and axial tension is practically the same.

75. Addition to Newtonian Mechanics Suggested

"A Discovery by a Soviet Scientist"; Yerevan, Kommunist, 14 Feb 63, p 1

Ye. V. Aleksandrov, a Soviet scientist, Candidate of Technical Sciences, and director of the Drilling Laboratories, Institute of Mines imeni A. A. Skochinskiy, made a big discovery in mechanics which appears to be an addition to Newton's law.

According to Newtonian mechanics, the result of a collision depends only on the ratio of the wieghts (masses) of the colliding bodies, while the coefficient of velocity recovery is determined only by the materials from which these bodies are made.

The new idea of the "critical mass" introduced by Ye. V. Aleksandrov in determining a collision changed qualitatively the estimation of the effects of collision. He established that such collision parameters as the energy transfer coefficient, the recoil coefficient, and the velocity recovery coefficient are determined mainly by the shape of the colliding bodies, which opens the possibility of the artificial control of the principal effects of collisions.

The conclusions and the recommendations made on the basis of his discovery and the method developed by him of protecting machines from shock loading and from vibration have wide application in Soviet machine building. Without changing the design of the machines, it will be possible to prolong their life and increase considerably the capacity of components and machines of impact operation which up to now quickly go out of order.

A photo carries the picture of Ye. V. Aleksandrov near a testing unit for investigating the coefficient of energy transfer during collision.

76. Ukrainian Institute for Low Temperatures

Moscow, Trud, 31 Jan 63, p 3

The caption of a photograph which shows senior engineer A. I. Pushkin adjusting an instrument to investigate the ultrasound absorption in metals for low refrigeration contains the information that the Physicotechnical Institute of Low Temperatures, Academy of Sciences Ukrainian SSR, is the first specialized institution of this kind in the country. Construction of the scientific complex for this institute has recently been completed in Khar'kov. Construction is now proceeding on the low temperature structure. In its extensive building is the machine room which is equipped with the very latest in equipment. This is where scientists have begun to obtain large quantities of liquefied gases -- nitrogen, hydrogen, and helium. Low-temperature investigations which are aimed at the creation of superdurable materials are being conducted in the institute.

Wave Phenomena

77. Problems of Sommerfeld's Theorem

"Properties at the Front of Electromagnetic Waves,"
by L. G. Yakovlev and A. Pardayev, Samarkand University; Tashkent, Izvestiya Akademii Nauk UzSSR,
Seriya Fiziko-Matematicheskikh Nauk, No.6, 1963
pp 92-100

Two problems are discussed in this article: Are waves in a vacuum (in strong, stable field) satisfied by Sommerfeld's theorem, and is there polarization of the field by the field? The second problem can take place only while violating Sommerfeld's theorem and only during the presence of various speeds for waves of various polarizations.

78. Diffraction of Nonstationary Waves

"Diffraction of Nonstationary Wave on Half-Plane," by
Ye. F. Afanas'yev; Moscow, Inzhenernyy Zhurnal, Vol 2,
No 4, 1962, pp 367-340

A new solution of the Sommerfeld problem for the case of diffraction of an acoustic wave with an arbitrary pressure profile is presented. The pressure field behind the front of the diffracted wave is determined in the form of simple quadratures.

Problem in diffraction of electromagnetic waves can be solved by a similar method.

Statistical Physics

79. Quantum Statistical Mechanics

"Kinetic Equation for Quantum Statistical Mechanism,"
by I. B. Aleksandrov, Yu. A. Kukharenko, and A. V.
Niukkanen; Moscow, Vestnik Moskovskogo Universiteta,
Seriya III, Fizika, Astronomiya, No 1, 1963, pp 11-19

A kinetic equation is derived for the spacially homogeneous
quantum mechanic system of particles which are subordinated to
Fermi statistics. It is proposed that the potential energy for
particles of paired interaction is small on the basis of which
the small parameter for the perturbation theory is introduced.
The equation obtained is accurate up to the terms of the second
order of smallness. The initial condition of the weakening of
correlations which are different for those known in quantum
mechanics was used to split the chain of equations for the cor-
relation functions.

80. Green's Functions and Distribution Functions in Quantum Statistics

"Green's Functions and Distribution Functions
in Statistical Mechanics of Quantum Systems,"
by N. N. Bogolyubov (Jr) and B. I. Sadovnikov,
Chair of Statistical Physics and Mechanics;
Moscow, Vestnik Moskovskogo Universiteta. Seriya
III: Fizika, Astronomiya, No 1, Jan/Feb 63,
pp 74-80

A chain of "interlocking" equations for Green's functions in
problems of quantum statistics is found by a method of varying
a system of equations for distribution functions, using a theorem
on "variation of the mean value of a dynamic quantity."

Optics and Spectroscopy

81. Installation of the UMB-1

Yerevan, Kommunist, 19 Feb 63, p 2

The caption of a photograph which shows two engineers, L. A. Cherstvov and N. V. Kaloshina, conducting experiments with a new device contains the information that the Moscow plant Fizpribor is completing the installation of the Beta spectrometer UMB-1. The UMB-1 was built by the engineers of the plant in collaboration with the Physicotechnical Institute imeni A. F. Ioffe, academy of Sciences USSR. It will be possible with the new device to solve a wide range of problems in the area of nuclear spectroscopy -- investigations of complex electron and positron spectra and a number of other problems on the study of radioactive matter. The device has a high precision reading of up to 0.015 percent.

The same caption, but with a photograph of N. Kaloshina and L. Cherstvov examining the new instrument, appeared in Leningradskaya Pravda of 6 February 1963, page 1.

82. Raman Scattering and Electron Absorption

"On the Relation of Combination Scattering Spectra and Electron Absorption," by M. M. Sushchinskiy and V. A. Zubov; Leningrad, Optika i Spektroskopiya, Vol 13, No 6, Dec 62, pp 766-774

The combination (Raman) scattering phenomenon with calculation of damping is investigated. It is shown that in the region of resonance the intensity of Stokes' lines of the combination scattering is proportional to the absorption coefficient of the excited line under consideration. The dependence of the intensity and polarization of the combination scattering lines and absorption coefficient on the wave length of the exciting light for some unsaturated hydrocarbons, benzene, and carbon tetrachloride is experimentally investigated. Results of some measurements made are given and compared with theory.

83. Long-Wave Infrared Region Spectrophotometer

"Spectrophotometer for the Long-Wave Infrared Region," by V. N. Murzin and A. I. Demeshina; Leningrad, Optika i Spektroskopiya, Vol 13, No 6, Dec 62, pp 826-830

The author devotes this article to the description of a vacuum recording spectrophotometer for the long-wave infrared region from 40 to 1,200 microns, built for thestudy of solids in the semiconductor physics laboratory at the Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR.

II. MATHEMATICS

84. Solution of Problem of Two Fixed Centers by Means of Series

"Solution of the Problem of Two Fixed Centers by Means of Series," by R. K. Choudkhari, Chair of Celestial Mechanics; Moscow, Vestnik Moskovskogo Universiteta. Seriya III: Fizika, Astronomiya, No 4, Jul/Aug 62, pp 83-91

A problem involving two fixed points with a given mass and at a given distance from each other is solved by means of series. The line passing through the two points is taken as the X-axis. A unit of distance is taken as half the distance between them; a unit of mass, the sum of the masses of both points. If the mass of one point c_2 is m, then the mass of the other point c_1 is $1-m$. r_1 is the distance from c_1; r_2, the distance from c_2; and the differential equations of motion have the form

$$\frac{d^2 x}{dt^2} = -k^2(1-m)\frac{x-1}{r_1^3} - k^2 m \frac{x+1}{r_2^3},$$

$$\frac{d^2 y}{dt^2} = -k^2(1-m)\frac{y}{r_1^3} - k^2 m \frac{y}{r_2^3},$$

$$\frac{d^2 z}{dt^2} = -k^2(1-m)\frac{z}{r_1^3} - k^2 m \frac{z}{r_2^3}$$

These eventually result in equations in x, y, and z of the form

$$x = \alpha_0 + \alpha_1 t - \frac{k^2 t^2}{2!}\left[(1-m)(\alpha_0 - 1)a_0^{-\frac{3}{2}} + m(\alpha_0 + 1)b_0^{-\frac{3}{2}}\right] + \alpha_3 t^3 + \ldots,$$

$$y = \beta_0 + \beta_1 t - \frac{k^2 t^2}{2!}\beta_0\left[(1-m)a_0^{-\frac{3}{2}} + mb_0^{-\frac{3}{2}}\right] + \beta_3 t^3 + \ldots,$$

$$z = r_0 + r_1 t - \frac{k^2 t^2}{2!}r_0\left[(1-m)a_0^{-\frac{3}{2}} + mb_0^{-\frac{3}{2}}\right] + r_3 t^3 + \ldots,$$

85. Stability of Particle-Like Solutions of Nonlinear Equations

"The Question of Stability of Particle-Like Solutions of a Non-
linear Equation for a Scalar Field," by Yu. P. Rybakov, Chair
of Statistical Physics and Mechanics; Moscow, Vestnik Moskovskogo
Universiteta. Seriya III:. Fizika, Astronomiya, No 4, Jul/Aug
62, pp 24-29

A general method for the study of stability of solutions of nonlinear
field equations, based on a generalized theorem of A. M. Lyapunov on stability
in distributed systems, is developed. The stability of particle-like solutions
of a nonlinear scalar field equation is studied by this method.

86. New Device To Measure Areas

"Intelligent Device": Moscow, Moskovskaya Pravda, 25 Jan 63, p 3

A new instrument to measure the area of figures of irregular shapes was
designed and developed in the department of heat technology, Institute of
Steel and Alloys, under the direction of Prof V. N. Kostochkin. N. A. Belov,
I. N. Belyayev, and N. A. Zubkov worked on this problem. The new instrument
is preferable to similar ones now in use. It has wide application in scientfic
research instututes, design bureaus in factories, and planning organizations.

87. Parametric Excitation of Oscillations

"Calculating the Parametric Excitation of Oscillations on the
Frequency of the Parameter's Variation," by V. V. Migulin,
Chair of the Theory of Oscillations; Moscow, Vestnik Moskovskogo
versiteta. Seriya III: Fizika, Astronomiya, No 1, Jan/Feb 63,
pp 32-37

Peculiarities in a parametric excitation of oscillations with a
frequency equal to that of the variation in the parameter are studied.
It is shown that a small modification in the method of slowly varying amplitudes
makes it possible to determine conditions for the excitation and to
distinguish the region of permissible variations in the natural frequency of
the excitated system from the frequency of the variation in the parameter.

88. <u>Zeros of Successive Derivatives of Analytic Function</u>

"Zeros of Successive Derivatives of an Analytic Function," by Yu.
A. Kaz'min, Chair of Theory of Functions and Functional Analysis;
Moscow, <u>Vestnik Moskovskogo Universiteta. Seriya I: Matematika,
Mekhanika</u>, No 1, Jan/Feb 63, pp 26-34.

Let $\overline{A_1}$ be the space of functions regular in the domain $|z| \geq 1$,
and vanishing at infinity. In this paper, the author investigates the
following problem: Find the exact value of the upper bound for numbers
$\{b\}$ with the property that for any sequence of complex numbers

$$\{\beta_k\}, \quad |\beta_k| \geq 1, \quad k = 0, 1, 2, \ldots, \quad |\beta_k| \to \infty,$$

satisfying the condition $\lim_{k \to \infty} \inf \frac{n_k}{|\beta_k|} \leq b$, the relations $\varphi^{(N_k)}(\beta_k) = 0$,

$k = 0, 1, 2, \ldots,$ where $\varphi(z) = \sum_{k=0}^{\infty} \frac{a_k}{z^{k+1}} \in \overline{A_1}$, imply $\varphi(z) \equiv 0$.

A theorem supplies the answer, sup $\{b\} = 0$.

Submitted on 16 March 1962.

89. <u>Extremal Problems   Class of Typically Real Functions</u>

"Extremal Problems in a Class of Typically Real Functions," by

M. P. Remizova; Kazan', <u>Izvestiya Vysshikh Uchebnykh Zavedeniy:</u>

<u>Matematika</u>, No 1, 1963, pp 135-144

A class T_r of functions $f(z)$ of the form $f(z) = z + \sum_{2}^{\infty} a_N z^N$, regular

and typically real in the unit circle $|z| < 1$, is studied. Using

results obtained by I. Ya. Ashnevits and G. V. Ulina ("Areas of Meaning

for Analytic Functions," <u>Vestnik Leningradskogo Gosudarstvennogo</u>

<u>Universiteta</u>, No 11, 1955, pages 31-42), the author derives a number of

inequalities which the functions $f(z) \in T_r$ and their derivatives $f'(z)$

satisfy. Exact upper and lower limits of the variations of Im $f(z)$,

Im $f'(z)$, Re $f(z)$, and Re $f'(z)$ are found. A class of typically real

functions $F(z)$ of the form $F(z) = -\frac{1}{z} + \alpha_0 + \alpha_1 z + \ldots$ which are

regular and do not become zero in $|z| < 1$, excluding the simple pole

at the point $z = 0$, is studied.

Submitted on 2 December 1959.

90. Solution of Elliptic Differential Equations on Digital Computers

"Methods for Solving Elliptic Differential Equations on Digital
Computers" (presented by Academician V. M. Glushkov, Academy of
Sciences of the Ukrainian SSR), by I. M. Molchanov, Institute of
Cybernetics of the Academy of Sciences of the Ukrainian SSR;
Kiev, Doklady Akademii Nauk Ukrainskoy SSR, No 1, 1963, pp 3-5

Algorithms for the solution of boundary value problems on electronic
computers are considered for two-dimensional, self-conjugate, second-order
differential equations of the elliptical type..

Iteration methods are proposed for solving a system of difference
equations obtained as a result of the approximation of the differential
equations by difference equations. These methods permit storage of the
required function in only part of the locations of the memory region.

91. Solution of Integral-Differential Equations

"An Approximate Solution of Integral-Differential Equations and
Differential Equations With Delayed Argument by the Method of
Oscillating Functions," by N. V. Sharkova, Perm' State University;
Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy: Matematika, No 1,
1963, pp 158-168

A method of oscillating functions, proposed by S. I. Mel'nik
("Oscillating Functions and Their Application to an Approximate Solution
of Integral Equations," DAN SSSR, Vol 95, No 4, 1954; and others), is used
to obtain an approximate solution of integral-differential equations and
linear and nonlinear differential equations with delayed argument (variable
delay)

Submitted on 30 December 1959.

92. Principle of Averaging for Parabolic and Elliptic Differential Equations

"The Principle of Averaging for Parabolic and Elliptic Differential
Equations and for Markov Processes With a Small Diffusion," by
R. Z. Khas'minskiy; Moscow, Teoriya Veroyatnostey i yeye Primeneniya,
Vol 8, No 1, 1963, pp 3-25

N. N. Bogolyubov's principle of averaging ("Certain Statistical Methods
in Mathematical Physics," published by Ukrainian SSR Academy of Sciences, 1945)
is proven for parabolic equations. Several theorems are presented. Theorem 1

is used for studying more general parabolic and elliptic equations. Theorem 3 is proven for the convergence of an invariant measure of a Markov process on a torus to an invariant measure of the flow on a torus.

Submitted on 30 June 1961.

93. Differential Equations and Point Mapping

"The Relation Between Small Variations in a System of Differential Equations and the Corresponding Point Mapping" (presented by Academician L. S. Pontryagin on 7 July 1962), by Yu. I. Neymark, Physical Engineering Research Institute of Gor'ki State University; Moscow, Doklady Akademii Nauk SSSR, Vol 148, No 2, 11 Jan 63, pp 281-283

In this paper, the following problem is solved:

Given T, the point mapping of the hyperplane S into itself, generated by the phase trajectories of the system of differential equations $\frac{dx_i}{dt} = X_i (x_1, x_2, \ldots, x_n)$ $(i = 1, 2, \ldots, n)$, defined in some space G, whose right sides are sufficiently smooth functions. It is assumed that the point mapping T has a fixed point M. The phase trajectory Γ, passing through the point M, is closed, and the periodic solution $x_i = \varphi_i(t)$ $(i = 1, 2, \ldots, n)$ of the given system of equations, with some period τ, corresponds to it. It is asked if any small variation of the mapping T in the neighborhood of M can be obtained for the some small variations in the right sides of the differential equations.

94. Periodic Solutions of Differential Operator Equations

"Periodic Solutions of Differential Operator Equations With a Small Parameter Associated With the Derivative" (presented by Academician I. G. Petrovskiy on 14 June 1962), by Yu. G. Borisovich; Moscow, Doklady Akademii Nauk SSSR, Vol 148, No 2, 11 Jan 63, pp 255-258

The differential operator equations

$$\varepsilon \frac{dx}{dt} + A[\bar{x}, \bar{y}] (t)x = f(\varepsilon, \bar{x}, \bar{y}) (t),$$

$$\frac{dy}{dt} + B[\bar{x}, \bar{y}] (t)y = g(\varepsilon, \bar{x}, \bar{y}) (t)$$

are given, where $A[\bar{x}, \bar{y}] (t)$ and $B[\bar{x}, \bar{y}] (t)$ are ω-periodic operators, $x(t)$ and $y(t)$ are continuous ω-periodic functions. These equations are studied for the case in which $A[\bar{x}, \bar{y}]$ does not depend on $\bar{x}, \bar{y}$ and is an unbounded operator, as, for example, in a boundary value problem for a parabolic equation.

Variations of the given equations are considered: (1) as a system of the form $x' + \varepsilon^{-1}A(t)x = \varepsilon^{-1}f(t)$, $y' + B(t)y = g(t)$, with periodic $A(t)$, $B(t)$, $f(t)$, and $g(t)$; and (2) as the equation $x' + \varepsilon^{-1}A(t)x = 0$, with continuous operator $A(t)$.

A theorem is presented for the solvability of the original equations.

95. Solution of Cauchy Problem for Operator-Differential Equations

"Uniqueness of the Solution to the Cauchy Problem for Operator-Differential Equations" (presented by Academician I. G. Petrovskiy on 21 August 1962), by L. N. Prokopenko, Kiev State University; Moscow, Doklady Akademii Nauk SSSR, Vol 148, No 5, 11 Feb 63, pp 1030-1033

The question of uniqueness of the solution to the Cauchy problem for the operator-differential equation in Banach space

$$\frac{du}{dt} = Au \quad u\Big|_{t=0} = 0 \quad (0 \leq t < T \leq \infty)$$

(and also for more general equations) is considered. In the given equation, the operator A is a closed linear operator in complex Banach space B. For the solution to the Cauchy problem, it is understood that the vector function $u = u(t)$, $0 \leq t < T$, which has meaning in B and nearly everywhere satisfies the given equation in a weak sense, is absolutely continuous.

96. Cauchy Problem for Linear Integral-Differential Equations

"Solutions of the Cauchy Problem for Linear Integral-Differential Equations," by I. S. Arzhanyskh and L. Ye. Krivoshein, Institute of Mathematics, Academy of Sciences of the Uzbek SSR, and Institute of Physics, Mechanics, and Mathematics, Academy of Sciences of the Kirgiz SSR; Tashkent, Izvestiya Akademii Nauk Uzbekskoy SSR: Seriya Fiziko-Matematicheskikh Nauk, No 6, 1962, pp 7-16

A method is given for the solution of the Cauchy problem for ordinary linear integral-differential equations by an integral transformation. To illustrate the method, the problem

$$y^{(i)} (x_0^{(i)}) = y_c^{(i)}; \quad (i = 0, 1, \ldots, n - 1, \quad x_0 \in [a, b])$$

is solved for the integral-differential equation

$$L[y] = f(x) + \lambda \int_a^b \sum_0^m K_i(x, t) y^{(m-i)}(t) dt,$$

where $L[y] \equiv y^{(n)}(x) + \sum_1^n a_i (x) y^{(n-i)}(x)$ and $K_i (x, t) \neq 0$, $(i = 0, 1, \ldots, m)$ for all $x \leq t \leq b$, for the cases in which (1) $n \geq m$ and (2) $m = n + p$, $p \geq 1$.

97. Fundamental System of Solutions of Integral-Differential Equation

"Derivation of an Integral-Differential Equation According to
Its Fundamental System of Solutions," by Yu. K. Lando; Minsk,
Izvestiya Akaademii Nauk Belorusskoy SSR: Seriya Fiziko-
Tekhnicheskikh Nauk, No 1, 1963, pp 24-32

A Green's function of the Cauchy problem is derived at the point
$x = a$ for the equation $Au = [L + (B + C)]u = f$, where $Lu = u^{(n)}(x) + p_1(x)u^{(n-1)}(x) + \dots + p_n(x)u(x)$; the coefficients $p_k(x)$; and
the function $f(x)$ are continuous in the interval $[0, 1]$;

$Bu = \int_0^1 k(x, y)u(y)dy$; the kernel $k(x, y)$ is regular in the square $0 \leq x, y \leq 1$;

$Cu = \sum_{i=0}^{n-1} a_i(x)u^{(i)}(0) + b_i(x)u^{(i)}(1)$; the coefficients $a_i(x)$ and $b_i(x)$
are continuous in the interval $[0, 1]$.

The general solution of this equation is obtained by means of Green's
function. A method is found for the derivation of the equation according
to a given fundamental system of its solutions and satisfied conditions
(for example, with a given differential operator L).

98. Spectral Tests for Stability of Solutions to Differential Equations

"Spectral Tests for Stability of Solutions to Linear Differ-
ential Equations With Periodic Coefficients" (presented by
Academician I. G. Petrovskiy on 3 October 1962), by Z. I.
Rekhlitskiy, Odessa Hydrometerological Institute; Moscow,
Doklady Akademii Nauk SSSR, Vol 149, No 2, 11 Mar 63,
pp 260-263

Necessary and sufficient conditions are determined for the bounded-
ness of solutions on the semiaxis $0 \leq t < \infty$ of differential equations of
the type $\frac{dy}{dt} - A(t)y = f(t)$, $y^{(n)} - \sum_{k=0}^{n-1} P_k(t)y^{(k)}(t) = f(t)$,

where $A(t + a) = A(t)$; $P_k(t + a) = P_k(t)$ $(a > 0)$.

Two theorems relating to such conditions for each of the two types of
boundary value problems are proven.

47

99. Convolution-Type Integral Equations and Functions of Exponential Increase

"Exceptional Cases of Convolution-Type Integral Equations and Corresponding Equations of the First Kind in the Class of Functions of Exponential Increase. The Class (A) Equation," (presented by Academician N. P. Yerugin, Academy of Sciences Belorussian SSR), by V. I. Smagina, Belorussian State University; Minsk, Doklady Akademii Nauk Belorusskoy SSR, Vol 7, No 1, Jan 63, pp 12-16

The article concerns the class (A) integral equation

$$\lambda\varphi(x) + \frac{1}{\sqrt{2\pi}} \int_0^\infty k_1(x-t)\varphi(t)dt + \frac{1}{\sqrt{2\pi}} \int_{-\infty}^0 k_2(x-t)\varphi(t)dt = f(x), \quad -\infty < x < \infty,$$

$$\lambda = \begin{cases} \lambda_1 & \text{for } x > 0 \\ \lambda_2 & \text{for } x < 0 \end{cases}$$
The solution of this equation is based on the assumption that all functions associated with it are integrable by quadratures on the real axis, leading to the solution of the Riemann boundary value problem for the half-plane.

The equation is studied by means of a Fourier transform. Two simple cases are considered: (1) $k_1(x) \in \{a_1, b_1\}$; $k_2(x) \in \{a_2, b_2\}$ and $a_1 \leq b_1$;

$$a_2 \leq b_2; \ a_2 < b_1$$

(2) $k_1(x) \in \{a_1, b_1\}$; $k_2(x) \in \{a_2, b_2\}$; $a_1 < b_1 < a_2 < b_2$;

$$\varphi(x) \in \{b_1, a_2\}; \ f(x) \in \{a_2, b_1\}$$

100. Oscillation of Solutions to Nonlinear, Nonautonomous Equations

"Several Questions in the Oscillation of Solutions of Nonlinear, Nonautonomous Second-Order Equations" (presented by Academician N. N. Bogolyuboy on 29 September 1962) by V. N. Shevelo and V. G. Shtelik, Institute of Mathematics of the Academy of Sciences Ukrainian SSR and computing center of the Academy of Sciences Ukrainian SSR; Moscow, Doklady Akademii Nauk SSSR, Vol 149, No 2, 11 Mar 63, pp 276-279

The article concerns several questions in the theory of the oscillation of solutions to nonlinear, nonautonomous systems involving many states of equilbrium. An attempt is made to classify motion and to formulate several problems in the oscillation of the given systems.

Four types of equations are considered:

$$(k[t]y')' + f(x, x', t) = 0$$

$$z'' + F(z, z', t) = 0, t \in [t_0 , \infty)$$

$$x'' + \alpha(t)x' + \beta(t)f(x) = 0$$

$$(m\ell^2\theta')' + mg\ell \, \sin \theta = 0$$

101. Systems of Equations With One Unknown in Free Groups

"The Solution of Systems of Equations With One Unknown in Free Groups" (presented by Academician P. S. Novikov on 4 September 1962), by A. A. Lorents; Moscow, Doklady Akademii Nauk SSSR, Vol 148, No 6, 21 Feb 63, pp 1253-1256

The question of an algorithm characterizing the solvability of systems of equations with one unknown in free groups is considered. The first results along this line were obtained by R. C. Lyndon (Trans. Am. Math. Soc., 96, 445, 1960). he succeeded in isolating the set of solutions ofthe equation $U(X)$ 1 in a free group as the set of values of the "parametric words" φ_i (i = 1, ..., n). The parametric words φ_i characterizing Lyndon's solution were of a fairly complex nature, and the number of parameters on which φ_i depended was limited only by the bounds of each equation considered.

The author has succeeded reducing the number of parameters to two, and he shows thet the problem of solvability of systems of equations with one unknown in free groups is equivalent to the solvability in nonnegative integers of systems of equations of the type $ax + by = c$, where a, b, and c are integers.

102. Elliptic Equations With Discontinuous Coefficients

"General Boundary Value Problems for Elliptic Equations With Discontinuous Coefficients" (presented by Academician S. L. Sobolev on 20 July 1962), by Ya. A. Roytberg and Z. G. Sheftel', Stanislav State Pedagogical Institute and Drogobych State Pedagogical Institute; Moscow, Doklady Akademii Nauk SSSR, Vol 148, No 5, 11 Feb 63, pp 1034-1037

The authors prove the solvability, in a generalized and ordinary sense, of general boundary value problems for elliptic equations of an arbitrary order with discontinuous of conjugation on the surfaces of the discontinuity are given by general differential operators. Problems for equations with discontinuous coefficients are studied with the aid of the type of inequalities indicated by the authors in a previous paper (DAN, Vol 148, No 3, 1963). The well-known functional method is used.

103. Irresolvable Measures in Dynamic Systems

"Irresolvable Measures in Dynamic Systems" (presented by Academician A. N. Kolmogorov on 17 August 1962), by M. I. Grabar'; Moscow, Doklady Akademii Nauk SSSR, Vol 148, No 5, 11 Feb 63, pp 1009-1012

The author studies a dynamic system with a compact space: i.e., a continuous one-parameter group $\{S_t\}$ of homemorphisms of the compact R on itself. It is well know that a normalized measure, invariant for a system $\{S_t\}$, is called irresolvable if, for any invariant relative to a system of a measureable set, this measure is equal to either 0 or 1.

The irresolvability of a measure relative to a homeomorphism of S_t is determined; and a theorem established the relation between measures which are invariant and irresolvable for an entire system $\{S_t\}$ and for its separate homeomorphisms. All measure are assumed to be normalized.

104. Zeros of Dirichlet L-Series

"Double Sums Connected With the Zeros of the Dirichlet L-Series," by A. I. Vinogradov; Leningrad, Vestnik Leningradskogo Universiteta: Seriya Matematiki, Mekhaniki i Astronomii, No 1, Issue 1, 1963, pp 59-63

Sums of systems of characters with coefficients are considered in the study of the Goldbach problem. Values depending on the imaginary parts of the zeros of the Dirichlet L-series are taken as coefficients.

105. Tensor Fields on n-Dimensional Sphere

"Tensor Fields on an n-Dimensional Sphere" (presented by Academician I. G. Petrovskiy on 5 July 1962), by N. I. Glazunov; Moscow, Doklady Akademmi Nauk SSSR, Vol 148, No2, 11 Jan 63, pp 264-267

The purpose of the paper is to describe spaces of tensor fields on an n-dimensional sphere S_n in Euclidean space E_{n+1}, invariant and irreducible relative to a complete orthogonal group $O(n + 1)$, and such that any continuous tensor field on S_n allows a uniform approximation by finite sums of the fields of these spaces.

106. Conformality of Surfaces in n-Dimensional Space

"Conformality of Surfaces in Space M_N," by V. I. Vedernikov,
Gor'kiy State University; Kazan', Izvestiya Vysshikh Uchebnykh
Zavedeniy: Matematika, No 1, 1963, pp 33-41

In 1950, the author determined the conformality of normalized surfaces
for the case of a surface V_2 in 3-dimensional conformal space M_3 and gave
it a geometrical interpretation ("Conformality of Surface," Uchen. Zap.,
Kazan' State University, Vol 110, Bk3). In this article, the concept of
conformality of normalized surfaces is generalized for m-dimensional
surface V_m in conformal space M_N. It is shown that the geometrical
interpretation which has meaning for V_2 in M_3 is carried over to this
general case. Subsequently, the conformality of surfaces which pro-
duces their conformal correspondence and has meaning only for the case
$M > 2$ is determined. Several theorems are presented relating to condi-
tions for conformality.

Submitted on 8 December 1959.

107. Coordinate Spaces

"Coordinate Spaces and Infinite Systems of Linear Equations,
II; Chapter II. Linear Operators in Coordinate Spaces," by Yu.
I. Gribanov, Kazan' State University; Kazan', Izvestiya Vys-
shikh Uchebnykh Zavedeniy: Matematika, No 1, 1963, pp 66-74

This is Part II of a paper begun by the author in an earlier issue
of the same journal (No 4, 1962). In this chapter, the author discusses
the general form of linear operators in coordinate spaces, general prop-
erties of matrix operators in coordinate spaces, and indications of con-
tinuity of martrix operators in coordinate spaces.

Submitted on 17 November 1960.

108. Density of Finite Functions in Space $L_p^{(m)}$ (E_n)

"Density of Finite Functions in the Space $L_p^{(m)}$ (E_n)," by Acade-mician S. L. Sobolev, Institute of Mathematics with the com-puting center of the Siberian branch of the Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 149, No 1, 1 Mar 63, pp 40-43

In this article, the author gives the direct prof of the following theorem: In the space of classes of functions $L_p^{(m)}$ (E_n) $(p > 1)$, defined in the entire Euclidean space E_n with the normal form

$$\|f\|^p_{L_p^{(m)}(E_n)} = \int \cdots \int \left[\sum_{\alpha = m} (D^{\alpha} f)^2 \right]^{p/2} dx,$$

finite functions form a dense set. In other words, the space $L_p^{(m)}$ (E_n) coincides with the closure of the set of finite functions of the above form.

109. Maximum Principle for Operators in Banach Space

"The Maximum Principle for a Class of Operators in Banach Space," by V. G. Maz'ya; Leningrad, Vestnik Leningradskogo Universiteta: Seriya Matematiki, Mekhaniki i Astronomii, No 1, Issue 1, 1963, pp 64-69

The paper is related to an article by P. Ye. Sobolevskiy and the author ("Generating Operators of Semigroups," UMN, 6, 1962). f_x denotes a linear functional in a real Banach space B with the following properties: $f_x(x) = \|x\|$, $\|f\| = 1$. By definition, the transformation A in B with the domain $D(A)$ belongs to the class $N(B)$, if for any $x \in D(A)$ $f_x(Ax) \le \omega \|x\|_B$.

Some properties of the transformation $A \in N(B)$ are stated; in partic-ular, maximum principles for the equations $\frac{dx}{dt} = A(t)x$ and $\frac{d^2x}{dt^2} + A(t)x = 0$. It is shown that the fourth-order elliptic operator for the Dirichlet prob-lem belongs to the class $N(L_p)$ $\left(\frac{3}{2} < p < 3 \right)$.

Submitted for editing on 8 February 1962.

110. Best Approximation of Continuous Functions

"The Best Approximation of Continuous Functions," by N. P. Korneychuk, Dnepropetrovsk State University; Moscow, Izvestiya Akademii Nauk SSSR: Seriya Matematicheskaya, Vol 27, No 1, Jan/Feb 63, pp 29-44

In the article are given the best approximations by trigonometric polynomials of periodic functions with convex moduli of continuity upwards. The value of the exact upper bound of the best approximations is established for classes of continuous functions, and the problem of obtaining it with the aid of linear polynomial operators is solved.

Submitted on 12 May 1961.

111. Linear and Quasilinear Equations

"A Boundary Value Problem for Linear and Quasilinear Equations and Systems of a Parabolic Type: Part III," by O. A. Ladyzhenskaya and N. N. Ural'tseva; Moscow, Izvestiya Akademii Nauk SSSR: Seriya Matematicheskaya, Vol 27, No 1, Jan/Feb 63, pp 161-240

A priori evaluations of various Holder-type averages are established for solutions of general quasilinear equations and solutions of specific classes of linear and quasilinear parabolic systems. The single-valued solvability is proven for these equations and systems in the entire first boundary value problem.

112. Approximating Periodic Functions by m-Singular Integrals

"Direct and Converse Theorems in the Theory of Approximating Periodic Functions by m-Singular Integrals," by R. G. Mamedov, Institute of Mathematics and Mechanics; Baku, Doklady Akademii Nauk Azerbaydzhanskoy SSR, Vol 18, No 12, 1962, pp 3-6

Direct and converse theorems are given for the approximation of periodic functions by m-singular integrals, discussed in a previous paper by the author (DAN Azerb. SSR, No 1, 1962). These theorems concern classes and orders of the saturation of m-singular integrals in the space $L_p(-\pi, \pi)$ $(p \geq 1)$.

113. Stability of Motion in Time Interval With Constant Perturbations

"Stability of Motion in a Given Interval of Time With Con-
stantly Acting Perturbations" (presented by Academician I.
Z. Shtokalo, Academy of Sciences Ukrainian SSR), by V. P.
Rudakov, Kiev Pedagogical Institute; Kiev, Doklady Akademii
Nauk Ukrainskoy SSR, No 1, 1963, pp 22-26

A determination is made for the stability of unperturbed motion in
a finite interval of time with constantly acting perturbations. The suf-
ficient conditions for stability in the given interval are found.

Submitted for editing on 19 December 1961.

114. Central Limit Theorem for Dependent Random Variables

"A Central Limit Theorem for a Class of Dependent Random Vari-
ables," by I. A. Ibragimov; Moscow, Teoriya Veroyatnostey i
yeye Primeneniya, Vol 8, No 1, 1963, pp 89-94

The random variables x_1, x_2, ... with the conditions $E\{x_j|x_{j-1}, \ldots\} = 0$
are considered, and two theorems on the normal convergence of sums $\sum_1^n x_j$
are established.

Submitted on 17 August 1961.

115. Optimum Detection Methods

"Optimum Methods in Problems of Quickest Detection," by A. N.
Shiryayev; Moscow, Teoriya Veroyatnostey i yeye Primeneniya,
Vol 8, No 1, 1963, pp 26-51

An observed process $\eta(t)$ satisfies a stochastic differential equa-
tion $d\eta = \chi(t - \theta)dt + d\xi$, where $\xi(t)$ is a standard Gaussian process
with independent increments (Wiener process), in which the moment a
"disorder" θ appears is not known. The basic quantity characterizing
the quality of this observation method is the mean time delay τ for
detection of a disorder.

The assumption $P(\theta > t) = e^{-\lambda t}$, with a known constant λ, is made.
It is then shown that for a given false alarm probability ω or for a
given N, the mathematical expectation of the number of false signals
occurring up till the moment the disorder appears, the method of ob-
servation minimizing $\tau = \tau(\omega)$ or $\tau = \tau(N)$, is based on an observation
of a posteriori probability, as given by the equation $\pi(t) = P(\theta \le t|\eta^t(s))$.

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A case is considered wherein the disorder appears against the background of steady-state conditions arising when the disorder is absent. A method is found for minimizing $\tau = \tau(T)$ for a given T, the mathematical expectation of the time between two false signals. The dependence $\tau = \tau(T)$ is given by the equation

$$\tau(T) = e^b[-Ei(-b)] - 1 + b \int_0^\infty e^{-bx} \frac{\ln(1 + x)}{x} \, dx,$$

where $b = 1/T$ and $Ei(-b)$ is an integral exponent of the function
$-Ei(-b) = \int_b^\infty \frac{e^{-t}}{t} \, dt,\ b > 0.$

Submitted on 30 June 1961.

116. Statistics of Related Trials

"Statistics of Related Trials" (presented by Academician A. N. Kolmogorov on 14 November 1962), by M. Rozenblat-Rot, Department of Mathematics and Mechanics, Bucharest University, Rumania; Moscow, Doklady Akademii Nauk SSSR, Vol 149, No 1, 1 Mar 63, pp 30-31

The author proves two theorems on probability:

1. Given a random variable ξ having a distribution $F^{(i)}(x)$ at the i-th moment of time (all i's are natural numbers) and an empirical distribution $F_n(x)$ of trials related by a nonhomogeneous Markov chain with non-zero coefficients of ergodicity α_i, where $\min_{1 \leq i \leq n} \alpha_i = O(n^{-\beta})$ $(0 \leq \beta < 1)$. Then if the distribution $F^{(i)}(x)$ is absolutely equicontinuous,

$$P \left\{ \sup_{-\infty < x < +\infty} \ | F_n(x) - \frac{1}{n} \sum_{i=1}^n F^{(i)}(x) | \to 0, n \to \infty \right\} = 1.$$

2. Given the distribution $F(x)$ of the random variable ξ and the empirical distribution $F_n(x)$ of the results of n observations of the quantity ξ in accordance with a homogeneous Markov chain with non-zero coefficients of ergodicity. Then

$$P \left\{ \sup_{-\infty < x < +\infty} |F_n(x) - F(x) | \to 0, n \to \infty \right\} = 1.$$

117. Theorem of the Mean

"A Theorem of the Mean" (presented by Academician A. N.
Kolmogorov on 12 October 1962), by A. A. Karatsuba and
N. M. Korobov; Moscow, Doklady Akademii Nauk SSSR, Vol
149, No 2, 11 Mar 63, pp 245-248

A new proof is given for Vinogradov's theorem of the mean (I. M.
Vinogradov, Izv. AN SSSR, Ser. Matem., 15, 109, 1951; and others)
which makes it possible to improve the factor, depending on n, in the
evaluation of the number of solutions of the system of equations

$$x_1^\nu + \ldots + x_k^\nu = y_k^\nu + \ldots + y_k^\nu + \lambda_\nu , \quad 0 \leq x, y \leq P\text{-}1 \ (\nu = 1, 2, \ldots, n),$$

where $\lambda_1, \ldots, \lambda_n$ are arbitrary fixed integers.

III. CONFERENCES

118. Recent Soviet Conferences on Physics and Mathematics

The conferences listed below were reported or announced in recent issues of Soviet periodicals. Included in the listing are the date and location of the conference, sponsoring organizations, and source. Unless otherwise noted, it is assumed that there was no non-Soviet participation in the conferences.

a. Third Annual Coordination Conderence of the Scientific Council on the Use of Mathemical Methods in Economic Research and Planning of the Academy of Sciences USSR; December 1962. (Vestnik Akademii Nauk SSSR, No 2, Feb 63, p 128)

b. All-Union Colloquim on Limit Theorems of the Theory of Probability; 17-22 September 1962, Fergana; sponsored by the Mathematics Institute imeni V. A. Steklov of the Academy of Sciences USSR, Tashkent State University imeni V. I. Lenin, and the Institute of Mathematics imeni V. I. Romanovskiy of the Academy of Sciences Uzbek SSR; representatives from the GDR and Hungary. (Teroiya Veroyatnosti i yey Primeneniye, Vol 8, No 1, 1963, p 112)

c. Fourth All-Union Conference on General Algebra (continuation of the Third All-Union Colloquim on General Algebra); 16-22 May 1962, Kiev; sponsored by Kiev University, the Institute of Mathematics of the Academy of Sciences Uzbek SSR, and the Institute of Cybernetics of the Academy of Sciences Ukrainian SSR. (Uspekhi Matematicheskikh Nauk, Vol 17, No 2 (108), Nov/Dec 62, p 191)

d. First All-Union Geometry Conference; 25 May-2 June 1962, Kiev; sponsored by Kiev State University imeni T. G. Shevchenko; representatives from the GDR and Rumania. (Uspekhi Matematicheskikh Nauk, Vol 17, No 6 (108), Nov/Dec 62, p 231)

e. 12th Annual Conference on Nuclear Spectroscopy; 26 January-2 February 1962, Leningrad. (Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, No 1, Jan 63, p 117)

f. 14th Conference on Spectroscopy; 5-12 July 1961, Gor'kiy. (Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, Vol 27, No 1, Jan 63, pp 1-116)

g. Conference on Apparatus and Methods of Investigation in the Vacuum Spectrum of the Ultraviolet Region; 17-19 May 1962, Leningrad; sponsored by the Commission on Spectral Instrument Building of the State

Committee for Coordination of Scientific Research Work under the Council of Ministers USSR, the Commission on Spectroscopy under the Department of Physicomathemical Sciences of the Academy of Sciences USSR, and the Section on Optics and Spectroscopy under the Leningrad House of Scientists imeni A. M. Gor'kiy. (Optika i Spektroskopiya, Vol 13, No 5, Nov 62, p 754)

h. Meeting of Leading Scientists Working in the Field of the Radiation Physics of Solids; middle of January 1963, Bakuriani; probably sponsored by the Scientific Council on the Problem "Solid State Physics." (Zarya Vostoka, 26 Jan 63, p 2)

i. Symposium on the Complex Study of the Liquid State of Matter; no date given, probably Moscow. (Moskovskaya Pravda, 17 Feb 63, p 4)

j. First All-Union Conference on Results of the International Geophysical Year; 2-? February 1963, Moscow. (Leningradskaya Pravda, 2 Feb 63; p 4; Pravda Ukrainy, 7 Feb 63, p 4; Izvestiya, 3 Feb 63, p 4)

k. Special Conference for a Discussion of Problems of the Scientific Planning of Observations of Artificial Earth Satellites; 21-27 November 1962, Pulkovo; sponsored by the Astronomical Council of the Academy of Sciences USSR; representatives from Bulgaria, Hungary, GDR, China, Mongolia, Poland, Rumania, and Czechoslovakia. (Vestnik Akademii Nauk SSSR, Nc 3, Mar 63, p 131)

119. Czechoslovak Conference on Optics

"Conference on Optics"; Prague, Pokroky Matematiky, Fyziky, a Astronomie, Vol 8, No 1, Jan/Feb 63, p 56

The Brno branch of the Association of Czechoslovak Mathematicians and Physicists will commemorate the 50th anniversary of the branch's establishment by conducting a national conference on optics during the second half of April 1963 [specific dates not given]. The central topics to be considered at the conference will be geometric and physical optics of all wave lengths and electron optics. (FOR OFFICIAL USE ONLY) (COPYRIGHT by the Publishing House of Czechoslovak Academy of Sciences, 1963)

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Washington, D.C. 20505

7 September 2004

Ms. Roberta Schoen
Deputy Director for Operations
Defense Technical Information Center
7725 John J. Kingman Road
Suite 0944
Ft. Belvoir, VA 22060

Dear Ms. Schoen:

In February of this year, DTIC provided the CIA Declassification Center with a referral list of CIA documents held in the DTIC library. This referral was a follow on to the list of National Intelligence Surveys provided earlier in the year.

We have completed a declassification review of the "Non-NIS" referral list and include the results of that review as Enclosure 1. Of the 220 documents identified in our declassification database, only three are classified. These three are in the Release in Part category and may be released to the public once specified portions of the documents are removed. Sanitization instructions for these documents are included with Enclosure 1.

In addition to the documents addressed in Enclosure 1, 14 other documents were unable to be identified. DTIC then provided the CDC with hard copies of these documents in April 2004 for declassification review. The results of this review are provided as Enclosure 2.

We at CIA greatly appreciate your cooperation in this matter. Should you have any questions concerning this letter and for coordination of any further developments, please contact Donald Black of this office at (703) 613-1415.

Sincerely,

Sergio N. Alcivar
Chief, CIA Declassification Center,
Declassification Review and Referral
Branch

Enclosures:
1. Declassification Review of CIA Documents at DTIC (with sanitization instructions for 3 documents)
2. Declassification Status of CIA Documents (hard copy) Referred by DTIC (with review processing sheets for each document)

Processing of OGA-Held CIA Documents

The following CIA documents located at DTIC were reviewed by CIA and declassification guidance has been provided.

OGA Doc ID	Job Num	Box	Fldr	Doc	Doc ID	Document Title	Pub Date	Pages	Decision	Proc Date
AD0336215	78-03117A	197	1	25	4482	Scientific Information Report Physics And Mathematics (27)	4/12/1963	68	Approved For Release	3/29/2004
AD0337652	78-03117A	200	1	4	4579	Scientific Information Report Physics And Mathematics (28)	5/10/1963	61	Approved For Release	3/29/2004
ADB810944	78-04392A	65	1	130	21179	Investigation Of The Structure Of Metals With An Electron Microscope	1/26/1952	14	Sanitized	3/29/2004
ADC051409	78-04392A	22	1	152	6751.49	Measuring The Partial Beta-Spectrum Of ThB By The Method Of Coincidences With The Aid Of A Double Beta-Spectrometer	12/12/1949	3	Sanitized	3/29/2004

U-04

C-09

The CIA has reviewed 220 DTIC documents with 41,108 pages