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SCIENTIFIC INFORMATION REPORT

Physics and Mathematics

(26)

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SCIENTIFIC INFORMATION REPORT

Physics and Mathematics (26)

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, four, Biology and Medicine, Electronics and Engineering, Chemistry and Metallurgy, and Physics and Mathematics, are issued monthly. The fifth series, Chinese Science, is issued twice monthly; the sixth series, Organization and Administration of Soviet Science, is issued monthly; and the seventh series, Outer Mongolia, is issued sporadically. Individual items are unclassified unless otherwise indicated.

Table of Contents

CONTENTS:

I. PHYSICS

Atomic and Nuclear Physics

1. Inelastic Nucleon-Nucleon Interaction

"Inelastic Nucleon-Nucleon Interaction," by I. A. Kuchin and P. A. Usik, Institute of Nuclear Physics, Academy of Sciences Kazakh SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1569-1574

In the single meson approximation, the interactions between two nucleons are examined for which only one nucleon is "excited" or both nucleons are not excited (the process is through $\pi\pi$ interaction). The magnitude and asymptotic behavior of the cross sections of such processes are estimated. It is found that the asymmetry in the angular distribution of secondary protons in p-n interaction at 9 Bev may be due to the process an of the type examined.

2. Proton Polarization in Stripping reactions

"Polarization of Protons in Stripping Reactions on Light and Medium Nuclei," by M. V. Pasechnik, L. S. Saltykov, and D. I. Tambovtsev; Moscow, Zhurnal Eskperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1575-1578

Experimental results of an investigation of the polarized effect in stripping reactions are given for light and medium nuclei. The deuteron energy is 13.8 Mev. The angular dependences of proton polarization are obtained for Be^{9}, B^{10}, and Ca^{40} nuclei targets and angles from 10 to 70°. The polarization is measured at small angles for Si^{28} and for the two isotopes Ni^{58} and Ni^{60}.

3. Spin of Eu^{152m}

"Determining the Spin of Eu^{152m}," by V. M. Lobashov, V. A. Nazarenko, and L. F. Sayenko, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1579,1481

The $\beta\gamma$ correlation between the β electron momentum and the γ quanta circular polarization in the allowed branch of the Eu^{152m} β decay with an end point β electron energy of 560 Kev and relative intensity of 1.2% is measured. The correlation coefficient $A_1 = +(0.40 \pm 010)$ indicates that a spin and parity of 1^- should be assigned to the Eu^{152m} isomeric state instead of the previously accepted value of 0^-.

4. Disintegration of the C^{12} Nucleus

"Disintegration of the C^{12} Nucleus Into Three α Particles As a Result of Inelastic Scattering of 80 Mev π^+ Mesons," by V. I. Bogamin, Z. Novak (GDR), and V. I. Ostroumov, Leningrad Polytechnic Institute; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1582-1591

The disintegration of C^{12} nuclei into three α particles as a result of inelastic scattering of 80 Mev π^+ mesons is studied by nuclear photoemulsions. The excitation of C^{12} nuclei to the 9.63 Mev level is found to contribute considerably to the cross section of the reaction ($\sim$20%). According to the angular correlation observed for the nuclei decay products, it is shown that the spin of this level exceeds one. The experimental data on the energy distribution of the particles can be explained be assuming simultaneous breakdown of C^{12} nucleus into 3 α particles with resonance interaction between the particles in the final state.

5. Energy Distribution for U^{238} Photofission Fragments

"Energy Distributions of Photofission Fragments From U^{238} for Various Peak γ Quanta Bremsstrahlung Energies," by B. A. Bochagov, A. P. Komar, and G. Ye. Solyakin, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Moscow Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1611-1615

The bremsstrahlung spectrum with $E_{\gamma max}$ = 17.5, 30, and 50 Mev from a synchrotron was used for obtaining contour diagrams of the distribution of kinetic energy of U^{238} photofission fragments. A double ionization

chamber was used as detector of the fragments. It is found that the kinetic energy of fragments emitted in symmetric fission is constant within 3 Mev when the mean excitation energy of the fissioning nuclei changes.

6. Pulsed Discharges in Argon

"Investigation of the Effect of an External Magnetic Field on the Development of a Pulsed Discharge in Argon," by S. I. Andreyev, M. P. Vanyukov, and A. T. Starovoytov, State Optical Institute imeni S. I. Vavilov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1616-1618

Results are given of the measurement of the brightness of light flashes from a pulsed discharge in argon in a quasistationary magnetic field H = 150,000 Oe and for its absence in the pressure interval 20-740 mm of mercury. The brightness of the light flashes for a pressure discharge of 20 and 100 mm of mercury when H = 150,000 Oe increases. It is shown that in the initial stage of the development of the discharge in the magnetic field H = 150,000 Oe, a decrese is observed in the rate of expansion of the discharge column compared to the rate of decrease when there is no external magnetic field.

7. Saturation Magnetization in Ferromagnetics

"Changes in the Saturation Magnetization of Ferromagnetics at Helium Temperatures," by N. V. Zavaritskiy and V. A. Tsarev, Institute of Physical Problems, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1638-1643

A change in the spontaneous moment M_s of iron and nickel is measured in the range 1.4-5°K. It is discovered that the temperature dependence of the quantity dM_s/dT is determined by the external magnetic field. In iron, it follows the Block law only at low field strengths. The data obtained are compared with the spin wave theory.

8. Angular Anisotropy of Gamma Quanta

"Angular Anisotropy of Gamma Quanta Accompanying U^{235} Fission," by M. V. Blinov et al.; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1644-1648

The angular anisotropy of instantaneous gamma radiation during the fission of U^{235} by thermal neutrons is determined. It is found that (12±2)% more gamma quanta are emitted in the direction of movement of the fragments than at 90° to the direction.

9. Polarization Properties of Synchrotron Radiation

"Investigation of Polarization Properties of Synchrotron Radiation From High Energy Electrons," by F. A. Korolev, O. F. Kulikov, and A. S. Yarov, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1653-1656

Data were obtained on the ratio between the intensity and the angular distribution of synchrotron radiation for both components of the radiating electron by rapid filming of the synchrotron radiation of electrons accelerated in the 680 Mev synchrotron of the Physics Institute, Academy of Sciences USSR. The relation between the real angular distribution of radiation for the π polarization component and the amplitude of the axial electron oscillations is established.

10. Triple Scattering of 660 Mev Protons

"Triple Scattering of 660 Mev Protons. III. Angular Dependence of Parameter R." by Yu. P. Kumekin et al., Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1665-1671

In connection with the program of reconstructing the pp scattering at ~640 Mev, further experiments on triple scattering of protons have been carried out. The experimental arrangement is described and the results of the measurements for parameter R at angles 54, 72, 90, 108, and 126° in the center of mass system are given. The results obtained are interpreted in terms of pp-scattering matrix amplitudes. Values of the moduli and the relative phases of the matrix elements are found for 90°.

11. Resonance Interaction of K Mesons

"Resonance Interaction of K Mesons," by Ya. I. Granovskiy and A. A. Pantyushin, Institute of Nuclear Physics, Academy of Sciences Kazakhskoy SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1684-1687

The effects in the physics of strang particles due to resonance K π interaction (K* meson) are examined. It is shown that in a number of cases this interaction determines the main features of the phenomena observed.

12. Electron-Photon Showers

"Electron-Photon Showers Produced by High Energy μ Mesons," by E. V. Gedalin, Institute of Physics, Academy of Sciences Georgian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1697-1700

Integral spectra of electron and phonon showers in thick absorbers are calculated by taking into account the direct formation of electron-positron pairs and brensstrahlung radiation by high energy μ mesons.

13. Vector Mesons in Elastic Scattering

"Possible Role of Vector Mesons in Elastic Scattering of High Energy π Mesons and Protons," by G. G. Arushanov, Physicotechnical Institute, Academy of Sciences Uzbek SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1709-1711

The contribution of the polar diagram due to vector particle exchange in elastic scattering of π Mesons and protons on protons is calculated, as well as π mesons on π mesons at high energies. Good agreement with experiments is obtained.

14. Relatavistic Coulomb Scattering

"Theory of Relatavistic Coulomb Scattering. II." by V. G. Gorshkov, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1714-1726

Formulas for the cross section of elastic scattering of electrons on nuclei are derived by taking into account the screening and the finite size of the nucleus by the Laplace transformation for the scattering charge density and for the expansion of the matrix elements according to the transformation parameter.

15. Inelastic Diffraction Processes

"Inelastic Diffraction Processes at High Energies," by Ye. D. Zhizhin and Yu. P. Nikitin; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Nov 62, pp 1731-1742

It is shown that the cross sections for inelastic processes due to diffraction of fast particles on nuclei can be calculated on the basis of the diagram technique. "Vertex" functions are obtained which describe elastic diffraction scattering which should be inserted in the diagram for inelastic diffraction processes. The differential and total cross sections for diffraction production of π mesons and strange particles resulting from the interaction between fast protons and nuclei, for diffraction production of nucleon-antinucleon pairs due to fast π meson pairs by high energy gamma quanta are calculated on the basis of the "black" spherical nucleus model.

16. Depolarization of μ^+ Mesons

Depolarization of μ^+ Mesons in Solids," by V. G. Nosov and I. V. Yakovleva; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1750-1764

The theory is developed of the depolarization of μ^+ mesons in matter taking into account the presence of an external magnetic field. The importance is shown for the process under consideration of chemical reactions involving μ^+ mesons. The parameters which enter into the formulas of phenomenological theory are determined by experimental data on depolarization of μ^+ mesons in emulsions, and the asymptotic trend of polarization in large fields is predicted. Certain possible mechanisms of the deplarization of an electron of muonium are discussed, and the effect produced by them is evaluated. The case of media with a high dielectric constant and slight frequency dispersion is examined.

17. Spin Waves and Paramagnetic Relaxation

"Spin Waves and Paramagnetic Relaxation in a Fermi Liquid," by I. P. Ipatova and G. M. Eliashberg, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1795-1803

Given a magnetic field in a Fermi liquid, there exists a branch of the spectra which corresponds to the spin waves. The process of resonance absorption leads to the excitation of spin waves. Damping of spin waves with wave vector equal to zero is associated with interactions that lead to nonconservation of spin. It determines the transverse time of relaxation. The longitudinal time of relaxation is found also.

18. Symmetry in Spin-Phonon Interaction

"Theory of Symmetry in Spin-Phonon Interaction," by A. K. Morocha, Physicotechnical Institute, Kazan' Affiliate, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1804-1812

The spin-phonon interaction Hamiltonian for crystals with a number of constants which include various mechanisms of spin-phonon interaction is derived by group theory methods. It is implied that the constant should be determined experimentally.

19. Moments of Inertia of a Heated Nucleus

"Moments of Inertia of a Heated Nucleus and Angular Anisotropy of the Fission Fragments," by Yu. T. Grin'; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1880-1884

The moments of inertia of a nucleus at a temperature $T \neq 0$ are calculated as a function of the excitation energy of the nucleus. Good agreement between the theory and experiments is found for the angular anisotropy of the fission fragments.

20. Gravitational Interaction of Fermions

"Gravitational Interaction of Fermions," by I. Yu. Kobzarev and L. B. Okun', Institute of Theoretical and Experimental Physics, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1904-1909

Gravitational interaction of 1/2 spin particles is examined in the linear approximation. It is shown that if gravitational interaction is taken into account, the question of whether there exists a free neutrino of two or four components acquired a physical meaning. The vertex part for the interaction between ferminons and the gravitational field is shown to possess properties which are analogous to those of the electrodynamic vertex described by the Ward theorem. The effects observed due to spins are examined.

21. Optical Anisotropy and Shape of Surface of Atomic Nuclei

"A Method for Investigating the Optical Anisotrophy and the Shape of the Surface of Atomic Nuclei," by L. Ye. Lazareva and B. A. Tulupov, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1910-1913

A method for investigating the optical anisotropy and the shape of the surface of atomic nuclei based on a study of the angular distributions of charged subbarrier particles emitting deformed nuclei in photonuclear reactions is discussed.

22. Scattering of Electrons on Protons

"Scattering of Electrons on Protons Taking Into Account the Dipole Moments," by A. A. Bogush and I. S. Satsunkevich, Institute of Physics, Academy of Sciences Belorussian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1953-1956

The differential cross section for the scattering of electrons on protons which possess a dipole structure is derived by a direct calculation of the matrix elements, taking into account the initial and finite longitudinal polarizations of the particles. The cross section correction calculated under the assumption that the proton has dipole moments (electrical and magnetic) may be invoked for explaining the discrepancy between the experiments and the generally accepted phenomenological model of the process.

23. Strange Particles

"Photoproduction of Strange Particles," by V. M. Arutyunyan, Physical Institute, Academy of Sciences Armenian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1964-1966

Photoproduction of $\Lambda^{o}K^{+}$ near the threshold is considered in the K* "particle" exchange. The result is compared with the experiment. Agreement is observed for a relative parity in the ΛK^{*} p-vertex $P_{\Lambda p} = -1$.

24. Neutrino and Cosmic Ray Intensity

"Neutrino and Cosmic Ray Intensity at Great Depths," by B. Pontecorvo and A. Ye. Chudakov, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1967-1969

The following results are obtained from an analysis of the intensity of charged penetrating particles at great depths: the energy density of energetic neutrinos ($E_\nu \gtrsim 1$ Bev) in the universe is at least three orders of magnitude smaller than the total nucleon energy density, and the neutrino-nucleon scattering cross section ($E_\nu \gtrsim 1$ Bev) is less than $10^{-34} cm^2$.

25. Fission Neutron Spectra

"Calculation of the Fission Neutron Spectra at Angles of 0°, 45°, and 90° to the Line of Flight of Fragments," by Ye. I. Sirotinin; Moscow, Atomnaya Energiya, Vol 13, No 6, Dec 62, pp 530-533

Neutron spectra emitted by fission fragments at angles of 0°, 45° and 90° to the line of their flight are determined on the evaporation model. It is assumed that in the coordinate system which is connected with the fragment the neutrons are emitted isotopically. The spectra which are calculated are in good agreement with the data of the experiment.

26. Calculation of Slow Neutron Spectrum

"Methods of Calculating the Slow Neutron Spectrum," by G. I. Marchuk et al.; Moscow, Atomnaya Energiya, Vol 13, No 6, Dec 62, pp 534-546

Formulas for the zero and the first moments of the indicatrix of scattering of thermal neutrons based on angular variables are given for a monoatomic gas model, as well as for a model which takes into account the molecular and the crystal bonds. A method is proposed to calculate the spatial energy distribution of thermal neutrons, taking account of thermalization of multizonal cylindrical cells in a P_3 approximation of the spherical harmonics method. Results of the calculation are compared with experimental data.

27. Measurement of the Neutron Spectra in Certain Lattices

"Measurement of the Neutron Spectra in Uranium-Water and Uranium-Monoisopropyldyphenyl Lattices," by V. I. Mostovoy et al.; Moscow, Atomnaya Energiya, Vol 43, No 6, Dec 62, pp 547-555

A detailed investigation is made of the neutron spectra in the cell of a heterogeneous subcritical system. The neutron spectra were measured with a mechanical velocity selector and a time analyzer. A water-water reactor was used as the neutron source for the subcritical system.

The results obtained show that in both the uranium and the moderator the neutron spectra differ from the balanced Maxwell distribution. The neutron spectra change sharply on the boundary of the uranium bar with the moderator. In the bar and the moderator themselves, the spectrum changes slightly. The connection between the thermal neutron spectra in the moderator and in the bar is a simple semiempirical relation.

28. Neutron Diffusion in Periodic Lattices

"Calculation of Neutron Diffusion in Periodic Lattices," by G. Ya. Rumyantsev; Moscow, Atomnaya Energiya, Vol 14, No 6, Dec 62, pp 556-562

A method is proposed to calculate the neutron diffusion in heterogeneous periodic lattices which require the soltuion of transfer equations only within the limits of one cell. A one-dimensional lattice is examined for simplicity in the diffusion approximation; however, the boundary conditions and the means of obtaining a general precise solution for all media are altogether sufficiently general. Along with the actual solution for all media, the macroscopic (averaged) solution, due to which the homogenization of the medium becomes easily feasible and quite natural, is given. In addition, the conditions for which the homogenization is possible are explained.

The method is applicable to both fertile and nonfertile media, as well as to media with independent sources.

29. Method To Calculate the Thermalization in a Cell

"A Three Group Method of Calculating the Thermalization in the Cell of a Heterogeneous Reactor," by L. V. Mayorov and M. S. Yudkevich; Moscow, Atomnaya Energiya, Vol 13, No 6, Dec 62, pp 563-567

A special selection of the test functions is proposed for a three-group calculation of the spatial-energy spectrum of thermal neutrons in the two-region cell of a heterogeneous reactor which has a temperature gradient. The results of the calculations are compared with those obtained for a 15-group calculation. This points to the possibility of using satisfactorily the three-group method to calculate the multiregion cells.

30. Absorption of Gamma Rays

"Absorption of Gamma Radiation in Infinite Lattice Systems," by B. M. Terent'yev, V. A. El'tekov, and Yu. S. Ryabuzhin; Moscow, Atomnaya Energiya, Vol 13, No 6, Dec 62, pp 568-571

The distribution of the absorbed energy of gamma radiation of the sources which produce an infinite lattice and the medium which surrounds them is compared. The distribution is calculated by the Monte Carlo method (producing a series of points on the curve) with the electronic computer Strela and by an increased approximation (producing a continuous straight line on the curve). The calculations are carried out to several magnitudes for the initial energy of the gamma radiation and for the volumetric share V of the source material, as well as for the irradiated medium of the two-component system. An indium-gallium liquid alloy was the source in one system and the fuel elements of a thermal neutron experimental reactor in the other. The medium irradiated in both cases was water. Based on the results obtained, it is concluded to limit the use of the increased approximation to the calculation of the distribution of the absorption energy of the gamma radiation in such systems.

31. Isotopic Spin Degeneration and the Hypercharge

"Degeneration With Respect to Isotopic Spin and the Hypercharge," by A. M. Baldin and A. A. Komar, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR. Vol 146, No 3, Sep 62, pp 574-576

Considerations in favor of the possible existence of quadruplet particles very close in mass with identical properties and distinguished only by the magnitude of the isotopic spin (T = 1 and T = 0) have been stated previously. Recently S. L. Glashow (Phys. Rev. Lett., Vol 7, 1961, p 469) analyzed the latest experimental data on the resonance in π-meson and π-meson-hyperon systems again, giving attention to the presence of individual coincidences in the properties of particles belonging to the isotopic multiplets with T = 1 and T = 0. In this article, the coincidences of the properties of particles are not treated as being random, and a possible explanation is examined.

32. Angular Distribution of Fast Particles

"Angular Distribution of Fast Particles Leaving a Metal Surface Irradiated by an Ion Beam," by Ye. S. Mashkova and V. A. Molchanov, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 3, Sep 62, pp 585-587

Results of the measurement of angular distribution of fast reflected particles at angles of incidence close to the glancing angle for ions on a target are given. A beam of 30 kev singly charged ions of argon had an angular convergence of $\pm 1^{\circ}$ and a current density of the order of 1 ma/cm^2. The other conditions of the experiment were the same as those used by V. A. Molchanov and V. G. Tel'kovskiy (DAN, Vol 136, 1961, p 801). A part of the ions in neutralized in the reflection of the ion elements with a large ionization potential. To measure both the ionic and the neutralized component, a device similar to that used by H. J. Montagen (Phys. Rev., Vol 81, 1951, p 1026) was constructed.

33. Polarization Phenomena in Direct Nuclear Reactions

"Polarization Phenomena in Direct Nuclear Reactions Taking Into Account the Spin-Orbit Interaction," by A. G. Sitenko and V. F. Kharchenko, Khar'kov State University; Kiev, Ukrains'kyy Fizychnyy Zhurnal. Vol 7, No 11, Nov 62, pp 1149-1159

The polarization phenomena in direct nuclear reactions with redistribution of particles (in stripping and capture reactions with deuteron formations), taking into account the spin-orbit interaction, are examined.

General formulas are obtained for angular distribution and polarization of the products of stripping and capture reactions under the action of polarized particles on arbitrarily oriented nuclei. A number of simple relations are established between the cross sections of the various processes and the polarization of the particles in these processes.

34. Elastic Scattering of Neutrons

"Elastic Scattering of Neutrons on Nonspherical Nuclei With a Rotational Spectrum," by V. S. Ol'khovskiy and Yu. V. Tsekhmistrenko, Kiev State University imeni T. G. Shevchenko, Institute of Physics, Academy of Sciences Ukrainian SSR: Kiev, Ukrains'kyy Fizychnyy Zhurnal, Vol 7, No 12, Dec 62, pp 1265-1270

The elastic scattering of neutrons on nonspherical nuclei with a pronounced rotational spectrum is solved by using Schroedinger's effective one-particle equation with a nonlocal potential operator. The model being examined describes mainly the direct interaction, while the effect of the formation of a compound nucleus is taken into account by introducing the surface absorption of neutrons. The experiment is compared with a simple optical model. There is better agreement of the results of the calculations with those of the experiment than with those of the optical model.

35. Charged Particle Radiation near a Metal Screen

"Radiation of a Charged Particle Flying Near a Metal Screen," by A. P. Kazantsev and G. I. Surdutovich, Institute of Radiophysics and Electronics, Siberian Department, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 1, Nov 62, pp 74-77

The radiation of a localized charged particle connected with the diffraction of an electromagnetic field particle on a metal screen is examined in this article. The case under discussion -- the screen itself is an ideally conducting semiplane, and the trajectory of the particle is perpendicular to the frame of the screen -- is of interest in that it makes it possible to find the precise solution for the problem of an arbitrary beta. Since the radiation loss is little, it is possible to consider that the particle moves with a constant velocity.

36. Spectra of Conversion Electrons for Isotopes of Erbium

"Investigation of Spectra of Conversion Electrons for Neutron Deficient Isotopes of Erbium," by A. A. Abrurazakov et al., Tashkent Polytechnic Institute, Joint Institute for Nuclear Research; Tashkent, Izvestiya Akademii Nauk UzSSR, Seriya Fiziko-Matematicheskikh Nauk, No 5, 1962, pp 69-76

The spectra of conversion electrons for isotopes of erbium produced by irradiating a tantalium target with 660-Mev protons on the synchrocyclotron of the Joint Institute for Nuclear Research were studied, using a Bata spectrograph with a constant homogeneous magnetic field. The half lives for the conversion lines were estimated by changing the intensities of the lines in successively irridated plates. The data obtained will make it possible to choose the mean gamma transitions (conversion lines) observed in the spectrum of the erbium group for the transitions which are attached to the decay of Er^{158} and Ho^{158}. As a result of the more precise measurement for the gamma transition energies, an assumption can be made about the levels of Dy^{158} at energies of 1361.2 Kev and 1672.2 Kev.

37. Atomic Reactor of the Latvian SSR

"Facts", Riga, Sovetskaya Latviya, 27 Oct 62, p 4

The atomic reactor of the Academy of Sciences Latvian SSR is in operation. Last summer it went critical and it was devoted to full research work. Its horizontal and vertical channels were transferred. This makes it possible for the scientists to carry out original investigations, for example on radioluminescence, which cannot be performed on an ordinary reactor. Conditions were created also to conduct radiochemical investigations.

The scientists have studied the neutron flux of the reactor. At present they irradiate regularly samples which are used in solid state physics. Scientists from Estonia work also on the reactor.

The operation of the atomic reactor is coordinated by a council composed of scientists from the Latvian SSR, the Lithuanian SSR, the Estonian SSR and representatives from industry.

Plasma Physics

38. Hydrodynamics of Plasma in Magnetic Field

"Relativistic Hydrodynamics of Plasma in Magnetic Field," by G. M. Zaslavskiy; Moscow, Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, No 5, Sep/Oct 62, pp 42-47

In the work "Boltzmann Equation and Hydromagnetic Equations for a Liquid Without Collisions," by G. Chu, M. Goldberger, and F. Low (Moscow, Problemy Sovremennoy Fiziki, Vol 7 1957, p 139), the hydrodynamics of plasma in a magnetic field was constructed when the time of collision as compared with the typical time of the processes is great. Here, the collisions were provided by a strong magnetic field which twisted the ions, and the expansion of distribution functions was in terms of powers of the Larmor radius. With the help of Chu, Goldberger, and Low, equations of the hydrodynamics of relativistic plasma in a magnetic field are derived, and the problem of propagation of small amplitude waves is solved. In the latter case, it is easy to obtain stability criterion for waves at right angles to the magnetic field, which would be difficult to do by using the kinetic equation.

39. Ion Longitudinal Plasma Oscillation in Magnetic Field

"Stability of Ion Longitudinal Plasma Oscillations in Magnetic Field," by V. N. Orayevskiy; Moscow, Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, No 5, Sep/Oct 62, pp 39-41

The stability of nonlinear steady ion longitudinal plasma oscillations in a magnetic field in investigated. It is shown that for certain values of the plasma parameters, the ion longitudinal oscillations are unstable with respect to the exitation of the two transverse waves.

40. "Anomalous" Diffusion of a Rarefied Plasma

"'Anomalous' Diffusion of a Rarefied Plasma With a Current in a Magnetic Field," by B. B. Kadomtsev; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1688-1696

It is shown that in the presence of a longitudinal current a rarefied plasma in a strong magnetic field is unstable with respect to waves of the drift type. This instability is similar to the current

convection instability of a plasma with finite conductivity, the only difference being that the collisions are replaced by Landau damping. Turbulent convection appearing as a result of such instability leads to "anomalous" diffusion of the plasma with a diffusion coefficient of the order of the Bohm coefficient.

41. Electron and Ion Temperatures of Fully Ionized Plasma

"Relaxation of the Electron and Ion Temperatures of Fully "Ionized Plasma in a Strong Magnetic Field," by V. P. Silin, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1813-1820

Under the conditions when the Larmor radii of plasma particles do not exceed the screening radius of the Coulomb field, the effect of a magnetic field on particle collision events becomes significant. In addition, the relaxation time of the electron and ion temperatures is dependent on the magnetic field. Appropriate values of the relaxation time are determined both in a broad range of relationships between electron and ion temperatures and in a broad range of magnetic values.

42. Radiation Processes and Transport Phenomena in Plasma

"Effect of Radiation Processes on Transport Phenomena in a Plasma in a Strong Magnetic Field," by A. I. Akhiyezer, V. G. Bar'yakhtar, and S. V. Peletminskiy, Kharivko State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1743-1749

It is shown that the processes of radiation and absorption of electromagnetic waves by electrons of a plasma in a strong magnetic field can substantially influence, not only the relaxation of electrons, but also the transport phenomena in the plasma. For this to occur in stationary fields, it is necessary that there exist, in addition to radiation collisions, mechanism capable of altering the photon distribution. In the case of a plasma with "trapped" radiation, this mechanism is the reflection of electromagnetic waves of frequency $\sim\omega H = eH/mc$ (where m is the electron mass, H is the magnetic field) from mirrors confining the plasma. If the transverse dimensions of the cylindrical mirror (with axis parallel to H) is considerably less than the free path length of photons with frequency $\sim \omega H$, the transverse conductivity of the plasma (like the transverse thermal conductivity) which is due to radiation processes is independent of the dimensions of the mirror and is determined by the effective time

between radiation collisions of the electrons. When $\tau_{eff} \ll \tau_e^{(s)}$, where $\tau_e^{(s)}$ is the mean time of coulomb relaxation, the transverse conductivity of the plasma will be determined, not by coulomb collisions, but by radiation collisions. The effects are compared at density $n \sim 10^{14}$ cm^{-3}, $H \sim 5 \times 10^7 G$, $T \sim 3 \times 10^{-3}$ mc^2.

In alternating fields, radiation processes can affect transfer phenomenon in the absence of mirrors.

43. Wave Excitation in a Plasma

"Wave Excitation in a Plasma Modulated by a Current," by A. N. Kondratenko; Kiev, Ukrains'kyy Fizychnyy Zhurnal, Vol 7, No 4, Apr 62, pp 376-377

A boundless plasma in a constant magnetic fiels is examined. The ion current which is modulated moves perpendicularly to the intensity of the external magnetic field in the plasma. To simplify the problem, the distortion of the current trajectory in the magnetic field is neglected. A current moving in a plane which can be oriented with respect to the magnetic field in two ways, parallel and perpendicular, is examined.

44. Oscillations Excited in a Plasma

"Correlation of Low Frequency and High Frequency Oscillations Excited in a Plasma by an Electron Beam," by M. D. Gabovich and V. G. Yazeva; Kiev, Ukrains'kyy Fizychnyy Zhurnal, Vol 7, No 9, Sep 62, pp 1019-1020

Results of experiments conducted with the aim of establishing the correlation between high-frequency and low-frequency oscillations in particles, particularly the correlation of the space distribution of their amplitudes, are given.

45. Diffusion of a Plasma

"Diffusion of an Inhomogeneous Rarefied Plasma Due to Excitation of Ion-Acoustic Oscillations," by B. D. Shapiro, Physico-techincal Institute, Academy of Sciences Ukrainian SSR; Kiev, Ukrains'kyy Fizychnyy Zhurnal, Vol 7, No 10, Oct 62, pp 1033-1045

Methods of the "quasilinear" theory of plasma stability were used to determine the saturation amplitudes and spectral "ion Acoustic" oscillations in an inhomogeneous plasma in a strong magnetic field.

The current of particles at right angle to the magnetic field due to the excitation of the "ion-acoustic" oscillations is calculated also.

46. Plasma Torus

"Equilibrium of a Plasma Torus in a Magnetic Field," by V. D. Shafranov; Moscow, Atomnaya Energiya, Vol 13, No 6, Dec 62, pp 521-529

Conditions of equilibrium for an axisymmetric plasma torus are obtained by the expansion of a/R (a and R being the small and large radii of the torus) without an exact definition of the shape of the distribution of the current and the longitudinal magnetic field along the cross section of the torus. It is only assumed that in a zero approximation ($R = \infty$) the plasma torus is cylindrically symmetric.

More precise formulas for the shift of the plasma torus are given for a conductive jacket suitable in the second approximation, that is, with regard to the terms of the order of b^2/R^2 where b is the radius of the jacket.

47. Magnetic Sound in Ionized Plasma

"Magnetic Sound in Plasma With Thermal Motion. I. Propagation Across a Constant Magnetic Field and Dissipation Due to the Scattering," by V. P. Demidov, D. A. Frank-Kamenetskiy, and V. L. Yakimenko; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, No 10, Oct 62, pp 1184-1189

The effect of gas pressure and collisions on propagation of magnetosonic waves in totally ionized plasma is investigated. Approximate forms of the dispersion equation are derived from hydrodyamic approximation and physical kinetics. It is shown that the effect of strong absorption by means of collisions near the hybrid frequency exists only in the ideal case of an absolutely cold plasma and is practically removed by thermal motion. Perspectives of magnetosonic heating of plasma using dissipative devices not associated with collisions are discussed.

48. Diffusion of Charged Plasma Particles in Magnetic Field

"Investigation of Diffusion of Charged Particles of Dense Plasma in a Magnetic Field," by A. I. Anisimov et al.; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, No 10, Oct 62, pp 1197-1204

Plasma decay in helium at pressures of 2×10^{-2} to 2×10^{-1} of mercury and electron density of 3×10^{11} to 3×10^{13} cm^{-3} are investigated. The plasma was probed by radio waves of a frequency range 9,400 to 36,600 mc.

The decay constant of the plasma was determined by the variations in the phase time of the waves' passage through the plasma. The radial distribution of electrons was controlled by the phase of the waves reflected from the plasma. As a result of the experimental investigation, it was established that for a magnetic field strength of up to 1,000 oe, the rate of diffusion of charged particles across the magnetic field is determined by the known expression for the coefficient of diffusion, which is obtained by calculation of paired collisions of electrons and ions. For magnetic fields greater than 1,000 oe, the rate of plasma decay is determined by the process of volumetric elimination.

49. Diffusion of Plasma in Magnetic Field

"Diffusion of Plasma in a Magnetic Field," by S. G. Alikhanov et al.; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, No 10, Oct 62, pp 1205-1211

A decaying helium plasma produced by a superhigh frequency inpulse discharge is experimentally investigated. The relation between plasma lifetime and a magnetic field up to 5,000 oe in an inert-gas pressure ranve of 2.5×10^{-2} to 2×10^{-1} mmof mercury is measured. The results of the experiment are in agreement with conclusions of the diffusion theory with calculation of paired collisions. The ciefficient of diffusion of He^+ in the absence of a magnetic field is measured (I_a=540cm^2/sec).

50 Investigation of the Jet of Plasma Generator

"Investigation of the Jet of a Plasma Generator," By L. I. Grechikhin and V. D. Shimanovich; Leningrad, Optika i Spektroskopiya, Vol 13, No 5, Nov 62, pp 626-629

The sturcture of the jet of a plasma generator is investigated. It is shown that the luminous jet is supersonic and that, therefore, a shock wave is observed. This shock wave in the jet of the plasma generator is caused by the stimulation of lines with high potentials of exitation.

51. Penetration of Magnetic Field into Plasma

"Penetration of High Frequency Traveling Magnetic Field Into Plasma," by R. A. Demirkhanov et al.; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, No 10, Oct 62, pp 1248-1253

Penetration of a 990-kc electromagnetic field in a hydrogen plasma with ionization up to 9% is experimentally investigated. In this case, collision frequencies of electrons with atoms and ions are considerably higher than the frequency of the electromagnetic wave, and the depth of the skin layer in the plasma can be determined the same as for a metallic conductor. The conductivity ($\sim 10^{14}$ CGSE), calculated from the depth of the skin layer, is in good agreement with the values obtained from data on temperature of the electrons and the concentration of charged particles.

52. Potential Structure and Volt-Ampere Characteristic of a Diode

Kinetic Theory of a Diode Filled With Rarefied Plasma," by R. Ya. Kucherov and L. E. Rikenglaz; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, No 10, Oct 62, pp 1275-1284

The authir investigates the distribution of potential in a diode filled with rarefied plasma, with the assumption that the potential in the interelectrode space is not monotonic. In this case, it is necessary to consider particles, captured in traps, originating close to the extremes of the potential. A complete solution of the problem for cases when the distribution of the captured particles is of the Boltzmann form is carried out. The corresponding volt-ampere characteristic sections are ploted, and the emf is computed.

53. Plasma Escape Through Magnetic Gaps of Traps

"Investigation of Plasma Escape Through Magnetic Gaps of Traps With a Field Rising to the Periphery," by L. L. Gorelik et al.; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 3, Nov 62, pp 576-579

Up to now, the problem of the effect of the region close to the zero point of a magnetic field on the yield of charged particles from magnetic traps with a field rising to the periphery remained unclarified. Moreover, experimental data were lacking on the changes with time of the width of magnetic gaps. Clarification of these problems is the goal of the experiments described in this article.

Solid State Physics

54. Emission of Nonequilibrium Electrons

"Emission on Nonequilibrium Electrons From Cadmium Sulfide," By V. F. Bibik, P. G. Borzyak, And O. G. Sarbey, Institute of Physics, Academy of Sciences Ukrainian SSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3003-3009

The cause for the appearance of electronic emission from cadmium sufide samples when a voltage is applied which does not lead to the heating up of the lattice is studied, as well as the cause of the increase in the emission during the illumination of the samples.

55. Infrared Absorption and Dispersion in LiF and MgO

"Infrared Absorption and Dispersion in LiF and MgO," by V. V. Mitskevich, Vilnyus State University imeni V. Kapsukas; Leningrad, Fizika Tverdogo Tela. Vol 4, No 11, Nov 62, pp 3035-3047

Absorption and dispersion in lithium fluoride and magnesium oxide are examined in the infrared region of the spectrum, disregarding both the anharmonicity of the lattice oscillations and the electrical moments of a crystal of high orders.

The optical constants computed for crystals are compared with experimental data, and the temperature dependence is investigated for optical constants.

The frequency spectra and the pulsed oscillations for LiF and MgO are given.

56. Effect of Trapping Levels in Semiconductors

"Effect of Trapping Levels on Kinetics of Impurity Photoconductivity in Semiconductors," by Ye. N. Arkad'yeva, Physicotechnical Institute imeni A. F. Ioffe, Acadey of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3048-3053

The effect of multiple trapping levels on the kinetics of impurity photoconductivity is examined. The theoretical calculation is compare' w'th the experimental results obtained on p-type germanium samples irradiated by 2-Mev electrons and on n and p-type CdTe.

The energy location is determined and a method of estimating the concentration of trapping levels is given.

57. Time Breakdown in Semiconductors

"Proceeding of Breakdown in Semiconductors," by V. A. Chuyenkov and Ch'en K'e-ming, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3054-3064

The breakdown of semiconductors in a pulsed magnetic field, taking into account the effect of the electric current, is investigated.

A case is examined when the duration of the pulse is less than the characterisric time of the conduction of heat in a semiconductor.

58. Transport Phenomena in Semiconductors

"Theory of Transport Phenomena in Semiconductors With Low Mobility (Peculiarities of energy Spectrum of the System)," by M. I. Klinger, Institute of Semiconductros, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3075-3085

The energy spectrum of semiconductors with low mobility is examined. The spectrum of the unperturbed system and the matrix of perturbation are determined by two basic functions, localized and nonlocalized, and their properties are investigated. The relation of some characteristics of the system for both bases is established.

59. Oscillations in Semiconductors

"Low Frequency Oscillations in Nonpolar Semiconductors," by G. V. Gordeyev, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela. Vol 4, No 11, Nov 62, pp 3144-3151

Longitudinal low-frequency vibrations for an electron-hole plasma in germanium semiconductors are examined. It is shown the weakly damped oscillations due to the drift of minority carriers in the external electrical field are possible in the absence of an external magnetic field in the plasma. Self-excitation of the oscillations of the plasma is possible with the presence of an external magnetic and electric field. Self-excitation is possible for a magnetic field of higher critical value. This depends on the angle between the direction of the magnetic field and the wave vector.

60. Kinetics of Formation of Photoelectret State

"Kinetics of Formation of the Photoelectret State in AgCl," by V. I. Bugriyeko, Odessa State University imeni I. I. Mechnikov, Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3155

Some problems of the kinetics of the formation of the photoelectret state in crystals cooled down to -150°C when stimulated by light of λ = 366 mμ are studied. The data obtained attest to the fulfillment of the reciprocity law for this process. The appearance of a "flash" in the charged current under the influence of red light (λ > 600 mμ) is given.

61. Combination Light Scattering in Crystals

"Combination Light Scattering in CsBr Crystals," by A. I. Stekhanov and A. P. Korol'kov, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3156-3160

The combination (Raman) scattering in CsBr crystals is studied. A combination scattering spectrum of the second order is obtained for CsBr. The effect of the temperature of the spectrum and the polarization state are investigated. It is shown that the intensity of the combination scattering is determined not only by a bromine ion but also by a cesium ion. The scattering spectrum of the second order obtained is depolarized, which is the result of the high symmetry of the CsBr lattice.

62. Photoconductivity in GaP

"Photoconductivity in GaP," by D. N. Nasledov and S. V. Slobodchikov, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3161-3164

The photoconductivity, that is, the spectral distribution, the dependence on the electric field, the illumination intensity, and the temperature (100-295°K), is investigated in partially compensated p-type GaP crystals. The presence of a deep acceptor level (0.55 ev) is established from the curve of the spectral distribution. The photolight falls with a reduction in temperature. An examination of the basic transitions in the energy level diagram makes it possible to explain the temperature dependence of the photoconductivity. The lifetime of the holes and the electrons, apparently, differ considerably due to the great effect of the traps.

63. Photoconductivity Relaxation

"Photoconductivity Relaxation and Current Carrier Lifetime in SiC," by G. F. Kholuyanov, Leningrad Electrical Engineering Institute imeni V. I. Ul'yanov-Lenin; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3170-3176

The relaxation photoconductivity in n- and p-type a SiC at the time of pulsed excitation for various levels of irradiation in temperatures from 85 to 700°K is investigated. The frequency characteristics of electroluminescence for the estimation of the lifetime of minority carriers are measured. The values obtained for n-type samples are 0.008-0.02 microsecond. The photoconductivity is monopolar due to the fast capture by traps of minority carriers. The lifetime of minority carriers is determined for stationary photoconductivity. The lifetime of the holes reached 0.01 sec for p-type samples.

64. Corrections to a Kinetic Equation

"Multiphonon Corrections to the Kinetic Equation," by V. V. Rumyantsev, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3189-3201

A two phonon correction to the kinetic equation for electrons in metals at high temperatures, when $T \gg 0$, is examined by graphic techniques. It is shown that the correction terms are small with respect to $\frac{h}{T\zeta}$ if the constant of the relation, the effective mass, and the chemical potential ζ are renormalized. Experimental data are considered from the point of view of the results obtained.

65. Current Carriers in Semiconductors

"Determination of the Sign, the Concentration, and the of Current Carriers Is Semiconductors," by A. I. Shelykh, Institute of Semiconductors, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3208-3210

A method is proposed to determine the basic parameters which determine the kinetic effects in conductors, that is, the sign, the concentration, and the mobility of the carrier. The method is based on the compensation of the displacement of the carriers under the action of an elextric field (drift) by the motion of the entire conductor in an opposite magnetic field. The transverse magnetic

field with respect to which carriers move under the action of the factors indicated serves only to determine the fulfillment of the compensation conditions and does not enter into the final computiny formulas. The case of a semiconductor with carries of one sign is examined.

66. Autoionization of Local States

"Theory of Autoionization of Local States," by Yu. Ye. Perlin and A. G. Cheban, Kishinev State University; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3220-3227

Quasi-classical method of computing the tunnel decay of a hydrogen-like atom in a strong electric field is generalized for the case when the electron is localized in a distorted Coulomb field (at small distances from the center). The probability of the tunnel transition of the electron from the polarized potential well of the polaron into the zonal state is computed. The quantum yield of the internal photoeffect from the F centers in a strong electric field is computed.

67. Infrared Absorption in Germanium

"Infrared Absorption in Heavily Doped Germanium," by V. S. Bagayev, G. P. Proshko, and A. P. Shotov, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3228-3235

The absorption of infrared radiation in heavily doped p-type germanium with a gallium concentration of from 10^{16} to 10^{20} cm^{-3} at 80 and 293°K is investigated.

It is established that for the impurity concentration from 10^{18} cm^{-3} and higher, the absorption edge shifts to high energies. Simultaneously, absorption by free carriers rises.

It is shown that the absorption is connected mainly with the indirect transitions of electrons from the valent zone to the zone of conductivity with the scattering of impurities on the ions. The scattering on the impurity is also prevalent at 80°K during the absorption by free carriers.

The magnitude of the Fermi energy as a function of concentration is determined from the data on the shift of the absorption edge. It is established that the dependence of energy on the pulse for stronly doped germanium is not quadratic and that the effective mass of the holes increases with the concentration.

68. Structure of Electron Field Emission

"Fine Structure of Spectral Dependence of Electron Field Emission From CdS Single Crystals," by B. V. Novikov, I. L. Sokol'skaya, and G. P. Shcherbakov, Leningrad State University; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3240-3243

The fine structure, consisting of a number of minimums which coincide exactly with the exciton absorption lines, is revealed from the curves of the spectral dependence of the electron field current for the monocrystal CdS.

The spectral distribution curves for the photoconductivity and the electron field current stripped in one crystal are similar qualitatively.

The electron field current maximum, located near the absorption edge from the long-wave side and which disappears partially or completely during bias infrared lightning, is observed under certain conditions.

A premise is given on the connection between this maximum and the increase in the regions of strong field for the selection of the electron field current with CdS crystals.

69. Secondary Emission of Dielectrics and Semiconductors

"Secondary Emission of Dielectrics and Semiconductors During Bombardment by Potassium Tons," by I. A. Abroyan and V. P. Lavrov, Polytechnic Institute imeni M. T. Kalinin; Leningrad, Fezika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3254-3259

The secondary emission proterties of monocrystals of alkali-halides LiF, NaF, NaCl, Kbr, CsCl, and the single crystal Si are investigated during the bombardment of their surface by potassium ions at energies of from 40 to 7,000 ev. Both positive ions of alkali metals and negative ions of halogens and molecular ions of alkali-halides were discovered among the secondary particles. New information on the dependences of the coefficients of positive and negative ion-ion emission on the energy of the primary ions is obtained. The dependence of the coefficients of ion-electron gamma emission on the temperatures of the targets is observed.

70. Radiation and Waves in Dielectrics

"Cherenkov Radiation and Additional Waves in a Dielectric," by F. G. Bass, M. I. Kaganov, and V. M. Yakovenko, Institute of Radiophysics and Electronics, Academy of Sciences Ukrainian SSR, and Physicotechnical Institute, Academy of Sciences Ukrainian SSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3260-3265

The spectral density of the radiation of a particle moving perpendicularly to the boundary of a dielectric is computed. The presence of additional transverse waves determined by space dispersion is taken into account. The role of the boundary conditions for the polarization vector is investigated.

71. Spin Lattice Interaction in Crystals

"Spin Lattice Interaction in Crystals With Isolated Paramagnetic Complexes," by L. K. Aminov and B. I. Kochelayev, Kazan' State University; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3273-3276

A simple correction is proposed to the theoretical Hamiltonian for the spin lattice interaction in paramagnetic crystals which takes into account approximately the difference in the mass of the particles which form crystals and the binding forces between them.

72. Thermal Electromotive Force of n-Type Germanium

"Thermal Electromotive Force of Heavily Doped n-Type Germanium," by V. I. Fistul' and K. V. Cherkas, State Scientific-Research and Planning Institute for the Rare Metals Industry; Leningrad, Fizika Tverdogo Tela, Vol 4, No 11, Nov 62, pp 3288-3292

The thermal electromotive force of germanium monocrystals doped by arsenic, antimony, and phosphorus within a wide interval of impurity concentration down to values close to the limit of solubility is investigated.

73. Recombination Carriers in n-Type Germanium

"Investigation of the Recombination of Carriers in n-Type Germanium Doped With Multicharge Impurities by Impurity Photoconductivity," by K. D. Glinchuk and Ye. G. Miselyuk, Institute of Semiconductors, Academy of Sciences Ukrainian SSR; Kiev, Ukrains'kyy Fizychnyy Zhurnal, Vol 7, No 9, Sep 62, pp 992-1002

A method is described to measure the lifetime τ of injected carriers in n-type germanium with multicharge impurities by the modulation of impurity photoconductivity. The cross sections for the capture of electrons by negatively charged atoms of Ni, Ag, and Au in germanium are determined for low temperatures.

74. Electron Structure of Metals

"Study of the Electron Structure of Metals by Nuclear Magnetic Resonance," by I. F. Shchegolev; Moscow, Uspekhi Fizicheskikh Nauk, Vol 78, No 2, Oct 62, pp 267-290

A study of the electron structure of metals by nuclear nuclear magnetic resonance and the results obtained are given. A study of the alloys, which is of independent interest, is not included.

75. Kinetic Theory of Semiconductors

"Kinetic Theory of Semiconductors With a Low Mobility," by I. G. Lang and Yu. A. Firsov, Institute of Semiconductors, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 5, Nov 62, pp 1843-1860

A low mobility theory for semiconductors with a narrow conductivity band (or a valent band) is developed for strong coupling between current carriers with lattice oscillations. At temperatures below the Debye temperature, the nonlocalized small radius polarons are the current carriers. For them the scattering operator is singled out and a transfer equation is set up making it possible to calculate various kinetic coefficients. It is shown that at temperatures exceeding Debye temperature, the main mechanisms of motion are the classical super barrier jumps of the current carriers from no to node in which the lattice actively participates. The temperature dependence of the mobility in this case is of an activation nature. The problem of the small parameters of the theory is examined. The results obtained are compared with the data of other authors.

76. Components of Secondary Ion Emission

"Study of the Relation Between Components of Secondary Ion Emission and the Energy, Kind of Ions, and Material of the Target," by U. A. Arifov and Kh. Kh. Khadzhimukhamedov; Moscow, Izvestiya Akademii Nauk SSR, Vol 26, No 11, Nov 62, pp 1422-1425

During the bombardment of a metallic surface with alkaline ions, a number of secondary processes take place. This article considers the process of ion emission and investigates only three components of the secondary ion emission -- streams of scattered, evaporated, and diffused ions which are distinguished on oscillograms by their energy and inertia features.

The results of the experiments showed that there is a complete balance of primary and secondary particles and, also, that the charged state of the secondary particles and the correlation between the values of the investigated coefficients depend on the parameters of the primary ion and target.

77. Depth of Discharge of Secondary Electrons

"On the Possibility of Determination of an Effective Depth of Discharge of Secondary Electrons From Dielectrics During Ion-Electron Emission," by L. P. Moroz and A. Kh. Ayukhanov; Moscow, Izvestiya Akademii Nauk SSR, Seriya Fizicheskaya, Vol 26, No 11, Nov 62, pp 1322-1327

This work represents a study of the time of saturation λ under various energies of bombarding ions.

NaCl coatings, being good emitters of secondary electrons during ion-electron emission, were used. Molybdenum, the coefficient of ion-electron emission of which is within the energy interval of alkaline ions 0.2 to 2.5 keV, was used as the base layer.

A study of the curves obtained from the two different values of ion energy showed that if the smaller of the two energies of bombarding ions E_{min} is smaller than some critical value E_c, $E_{min} < E_c$, the coefficient of the ion-electron emission becomes independent of the thickness of the film (the smaller the energies of the bombarding ions, the smaller the thickness at which it becomes independent); and if the smaller of the two energies of the bombarding ions is greater than E_c or equal to it ($E_{min} \geq E_c$), then the saturation of coefficients of ion-electron emission is reached at the same thickness of the film, independently of the energies of the bombarding ions.

The value E_c for Na^+ ions was found to be 1,000 eV.

78. p-n Transitions

"Electron Optical Study of p-n Transition in Germanium and Silicon," by N. N Sedov, G. V. Spivak, and R. D. Ivanov; Moscow, Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, Vol 26, No 11, Nov 62, pp 1332-1338

A method of observation of p-n transition by means of secondary electron emission, caused by bombardment of the object with fast positive ions, with subsequent focusing of the secondary electrons in the qualitative system of the emission microscope, is described. The p n transition was observed by an all-metal mirror electron microscope. A more advanced model of the all-metal mirror, which made it possible to improve the qualitative method of determination of the parth of the potential within the transition, was used.

Another method of determination of the path of the potential in the transition has also been developed. This method uses raster electron optics. Here, the path of the potential is directly seen on the oscillograph screen.

79. Phononless Transition in Centers of Crystals

"Probability of a Phononless Transition in Impurity Centers of Crystals," by Yu. D. Trifonov, Leningrad State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 4, Dec 62, pp 826-828

The probability of a phononless transition will be greater, the less the Stoke loss and the greater the magnitude of the average oscillating quantum. Comparing P (ω_0) with the second and higher moments of $\widehat{a}$ the spectral curve, it is possible to find the relation between the temperature dependence P (ω_0) and the temperature change and the shape of the pole.

Mechanics

80. Kinetic Equations for Partially Ionized Gases

"Equations for Heat and Electrical Conductivity of Partially Ionized Gas, " by A. F. Nastoyashchiy and L. D. Puzikov; Moscow, Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, No 5, Sep/Oct 62, pp 52-58

"Equation are derived which describe the processes of heat and electric conductivity in a partially ionized gas. The system of kinetic equations for the mixture of electrons, ions, and atoms is

expressed in a linear approximation by gradients and solved for the flows. It is assumed that the volumetric recombination does not take place and the temperatures of the components of the mixture are the same.

81. Interaction of Plane Wave With Moving Media Boundary

"Interaction of the Shock Wave in Elastoplastic Medium With a Moving Obstruction," by G. M. Lyakhov and N. I. Polyakova; Moscow, Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, No 5, Sep/Oct 62, pp 89-95

On the basis of previous works (Izv. AN SSSR, OTN. Mekhanika i Mashinostroyeniye, No 3, 1960; Izv AN SSSR, OTN. Mekhanika i Mashinostroyeniye, No 1, 1961), the author gives a solution to the problem of the interaction of a plane wave with a moving obstruction or media boundary in the case of large stresses. The wave is a shock wave.

82. Movement of Viscous Plastic Liquid

"Solutions of Inverse Problems of Transient Movement of Viscous-Plastic Liquid," by G. T. Gasanov and A. Kh. Mirzadzhanzade; Moscow, Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, No 5, Sep/Oct 62, pp 117-120

It is known that in the case of the movement of a viscous plastic liquid there are viscous plastic and elastic (so-called nucleus of the flow regions of movement.

Since with transient movement the nucleus of flow is a function of time and must be determined, the investigation of transient problems of a viscous plastic liquid in the general case is reduced to a solution of a boundary problem with an unknown moving boundary.

Exact solutions for two cases of transient movement of viscous plastic liquid in the general case were obtained by A. I. Safronchik (PMM, 1959, Vol 23, No 5 and 6). It should be noted that to determine the size of the nucleus, a nonlinear integral equation of the Volterra type is obtained for which an effective solution is difficult to find.

It was found that by conversion to the so-called inverse problem, the solution is considerably simplified. In solutions of inverse problems, a law of change of nuclei dimensions with time is given, and the rate of motion of a pipe or plates corresponding to this law is determined.

83. Calculation of Laminar Boundary Layer

"Approximate Integration of Equations of Laminar Boundary Layer on a Porous Surface in an Incompressible Liquid," by L. F. Kozlov; Moscow, Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, No 5, Sep/Oct 62, pp 121-127

The author attempts to use the system of three equations of moments for an approximate integration of the equations of laminar boundary layer on a porous surface in an incompressible liquid. The solution of this system was obtained in the form of a quadrature and ordinary interpolation relations connecting the basic characteristics of the boundary layer.

By a porous surface in this article is understood a surface in a flow in which the normal component of velocity is not equal to zero.

84. Simple Loading in Heterogeneous Medium

"Condition of Simple Loading in a Heterogeneous Medium," by A. G. Zhuravlev; Moscow, Vestnik Moskovskogo Universiteta, Seriya I, Matematika, Mekhanika, No 6, Nov/Dec 62, pp 39-42

A condition of simple loading in a heterogeneous medium is presented by considering the example of a nonuniformly heated body.

85. Theories of Plasticity for Complex Loading Processes

"Applicability of Some Theories of Plasticity in Description of Complex Processes of Loading," by R. A. Vasin and T. D. Karimbayev; Moscow, Vestnik Moskovskogo Universiteta, Seriya I, Matematika, Mekhanika, No 6, Nov/Dec 62, pp 62-64

The author shows that some theories of plasticity (Levy-Mises, Reiss, Prager, Hencky) follow from the relation:

$$d\bar{s} = \frac{1}{N} d\bar{\sigma} + \frac{N-P}{NP} (\sigma d\sigma) \frac{\sigma}{\sigma^2}$$

for loading along a broken line and cannot describe processes which are more complex than those defined by this equation.

86. Heat Transfer of a Supersonic Gas Flow

"Experiments on Heat Transfer of a Supersonic Gas Flow in a Circular Tube With Large Temperature Gradients," by V. A. Mukhin, A. S. Sukomel, and V. I. Velichko; Minsk, Inzhenerno-Fizicheskiy Zhurnal, No 11, Nov 62, pp 3-7

Experiments on heat transfer of an air flow in a tube over the range of M = 0.1 - 0.3, Re - (0.4 - 7.0)10 , $\theta = T_{ac}/T_c$ = 1 - 2.7 have shown that heat transfer is governed by the equation $Nu = 0.22Re^{0.8}Pr^{0.43}\tau^{0.43}$. The Nusselt number is found to be independent of the temperature factor under the present condition of cooling a flow.

87. Heat and Mass Transfer in Evaporation

"Heat and Mass Transfer in Evaporation Processes," by A. V. Lykov; Minsk, Inzhenerno-Fizicheskiy Zhurnal, No 11, Nov 62, pp 12-24

An analysis is made of the effect of cross flow of matter on heat transfer in a laminar flow around a wet capillary porous plate. Laws governing heat and mass transfer during evaporation of liquid from capillary porous bodies are established. It is shown that in the case of a depression in the evaporation surface, the coefficients of heat transfer are larger than on the surface of the body.

88. Determination of Vortex Forces

"Determination of Forces Caused by Vortices," by A. E. Dol'nikov; Minsk, Inzhenerno-Fizicheskiy Zhurnal, No 11, Nov 62, pp 97-100

The author describes the experiment in determining the effect of the vortex force H(t) on a circular rod fixed by a cantilever. A table of data on the difference in the phases and in amplitude of vibrations in two perpendicular directions for the flow velocities v = 4.84; 5.14; 6.44; 6.76; 10.32 m/sec, as well as the values of the lift force C_L caused by vortices, is given.

89. Steady-State Problem of Magnetic Hydromechanics

"Steady-State Problem of Magnetic Hydromechanics With Dependence on Two Coordinates; Collision of Jets of the Conducting Liquid," by V. S. Tkalich; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye, No 5, Sep/Oct 62, pp 32-38

A steady-state problem with one quasi-cyclic coordinate (Analiticheskaya Mekhanika [Analytic Mechanics], by A. I. Lur'ye, Fizmatgiz, 1961) is investigated. In the presence of dissipation, a class of solutions in which the function of the flow satisfies the Helmholtz equation is constructed; the integral of energy is obtained.

For the class of movements close to the potential, expressions for the lifting force and its moment, which represent a generalization of Zhukovskiy's theorem and Chaplygin's formula, are obtained.

90. Mechanics of Saturated Porous Media

"Linear Approximation in Mechanics of Saturated Porous Media," by V. N. Nikolayevskiy; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye, No 5, Sep/Oct 62, pp 59-62

The author sets forth a linear approximation in the theory of deformation of homogeneous isotropic porous media saturated with homogeneous liquid. The approach used differs somewhat from the one generally adopted in soil mechanics ("General Theory of Three Dimensional Consolidation," by M. A. Biot, J. Appl. Physics, 1941, No 12, pp 155-165, et al.).

91. Effectiveness of Porous Cooling

"Laminar Boundary Layer on Porous Plate in Presence of Chemical Reaction on the Surface," by V. S. Avduyevskiy and Ye. I. Obroskova; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye, No 5, Sep/Oct 62, pp 3-12

The effectiveness of porous cooling depends highly on the physical properties of the coolant employed. Results of the calculations of a laminar boundary layer on a porous surface can be represented with a certain accuracy in the form of engineering formulas from which it follows that the smaller the molecular weight of the gas applied to the surface the greater the reduction in the coefficients of heat exchange and friction.

If the applied gas enters into a chemical reaction, the molecular weight and physical properties of the mixture may substantially change. This work investigates the laminar boundary layer on a porous plate in the presence of chemical reactions. Results of numerical calculations of the equations of the boundary layer for the case where carbon and hydrogen burn on the surface with binary diffusion within the boundary layer are given and approximating formulas are presented.

92. Effect of Surface-Active Medium on Surface Energy of Body

"Effect of Surface-Active Medium on Surface Energy of Brittle Body," by V. V. Panasyuk and S. Ye. Kovchik (Presented by Academician P. A. Rebinder, 29 Apr 62); Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 1, Sep/Oct 62, pp 82-85

The strength of an actual solid body is determined not only by the physicochemical nature of the body, but it also depends to a considerable extent on thenature of defects in its structure and its environment. Defects in the microstructure of a solid body in the form of minute cracks and scratches are the cause of large concentrations of stresses which substantially lower the mechanical strength of the body in the process of its deformation, especially in a surface-active medium.

Experimental data of the effect of a surface-active medium (water) on the magnitude of surface energy, which determines the breakdown of silica glass, is examined. Measurement of this value, resulting from the conditions of the development of the crack, is of considerable interest.

93. Radiative Properties of Gases at High Temperatures

"Approximation Study of the Problem of Radiating Flow of Gas Around a Plate of Finite Length," by A. T. Onufriyev; Moscow, Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, No 5, Sep/Oct 62, pp 70-74

In flow of gas of high temperature in the combustion chambers of engines or gas-steam equipment and in connection with other problems of external and internal aerodynamics at high gas temperatures, of it is necessary to take into account the heat transfer through radiation.

In this article the author, using a plate of finite length, makes an attempt to establish the influence of the relation of the length of the radiation path to the dimensions of the body on the magnitude of heat flux coming to the body from the high temperature gas stream flowing around the body.

94. Mechanical Properties of Aluminum in Ultrasonic Field

"Investigation of Mechanical Properties of Aluminum in Ultrasonic Field," by V. P. Severdenko and V. V. Klubovich; Minsk, Doklady Akademii Nauk BSSR, Vol 6, No 9, Sep 62, pp 563-566.

A number of works appeared recently on theinvestigation of the deformation of metals in an ultrasonic field [Acta Metallurgica, by F. Blaha and B. Langenecker, 7, No 2, 1959, pp 93-100; and Ul'trazvukovaya Tekhnika (Ultrasonic Engineering), IL, 1958]. The need for such investigations is brought about by the peculiar bwhavior of metals and alloys under the effect of alternating sign loads (vibration). Of particularly great interest is the study of the effect of ultrasonic oscillations on plastic and fatigue properties of metals.

This article sets forth the procedure for conducting experiments and gives the results of investigation of the process of stretching of aluminum in an ultrasonic field.

95. Soviet Theories on Gravity

"Mysteries of Gravity"; Prague, Zapisnik 62, Vol VI, No 24, 17 Nov 62, pp 19-21

In addition to a general discussion of gravity, the article mentions a theory on gravity forwarded by Soviet Prof [fnu] Stanyukovich, who maintains that gravity is not a constant quality, as has heretofore

been assumed, but rather that its force may vary according to the state of elementary particles. Thus gravity increases under the influence of heat, and a decline in temperature to 0° [Centigrade] leads to a significant decline in the gravitational force, and possibly to its disappearance, according to Stanyukovich. The source of gravity is the so-called nuclear pulsation in which not only the nucleus of the atom pulsates, but also the electrons, he believes. He feels that all elementary particles composing the atom pulsate constantly and are in motion. Since these pulsations occur in a gravitational and electromagnetic field, they are accompanied by a release of a certain amount of energy and this is known as "gravitons." Stanyukovich maintains. At a temperature equal to the absolute freezing point, the rate of conversion of matter into "gravitons" (i.e., into quantities of energy) will be lower than under normal conditions. Then, if a body puts out less "gravitons," it will also weigh less, Stanyukovich's theory continues.

However, a number of Soviet and foreign physicists disagree with Stanyukovich's explanation. For example, Professor [fnu] Ivanenko believes that one may speak of gravitational waves while Professor Infeld, noted Polish physicist and [former] coworker of Einstein, rejects this [presumably Stanyukovich's] theroy.

Nearly all noted scientists agree that a gravitational field consists of minute particles -- "gravitons." Their diameter is extremely small, but contain extreme forces -- far greater than is contained in the nucleus of the atom. Thus the structure of the "gravitons" is very difficult to determine. (FOR OFFICIAL USE ONLY) (COPYRIGHT by the Publishing House of the Czechoslovak Ministry of National Defense, 1962)

96. First Boundary Value Problem of Nonlinear Theory of Elasticity

"Validity of Principle of Dirichlet for the First Boundary Value Problem of Nonlinear Theory of Elasticity," by A. L. Krylov (presented by Academician S. L. Sobolev, 28 Mar 62); Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 1, Sep/Oct 62, pp 54-57

It is known that the equations of equilibrium of an elastoplastic medium may be derived from some variational principles where the solution of the problem imparts a minimum to some positively determined functions. The existence of the solution of these variational problems is called the principle of Dirichlet and is widely used in heuristic discussions. The Dirichlet principle has been proven for some linear equatons in a number of works. The validity of the Dirichlet principle in nonlinear

problems of the theory of elastoplastic media was established by V.T. Koyter [Obshchiye Teoremy Teorii Uprugo-Plasticheskikh Sred (General Theorems of the Theory of Elastoplastic Media), II, 1961, par. 7]. In the present work the author solves this problem for the case when displacements are assigned on the boundary (first boundary value problem).

97. Quantum Field Theory on Probability Amplitude

"Certain Physical Results of the Theory of Quantum Field of Probability Amplitude," by I. V. Khimich, Yu. M. Lomosadze and I. Yu. Krivskiy, Uzhgorod State University; Kiev, Ukrains'kyy Fizychnyy Zhurnal, Vol 7, No 9, Sep 62, pp 967-973

An algorithm for the calculation of magnitudes observed in the usual setup of an experiment on the physical interpretation of the vector of state in the quantum field theory of probability amplitude is constructed by a new theory. The general structure of the effective cross sections obtained in the new theory is clarified by means of this new algorithm within the framework of the perturbation technique. It is shown that the results of the calculation by the new theory of magnitudes observed in the usual setup of the experiment agree more fully with the results of the usual quantum field theory. A number of considerations as to the physical essence of the new theory are prescribed.

98. Quantum Space Time Theory

"Different Parametrizations in Quantum Space-Time Theory," By V. G. Kadyshevskiy. Joint Institute for Nuclear Research; Moscow, Doklady Akademii Nauk SSSR. Vol 147, No 3, Nov 62, pp 588-591

Problems connected with the ambiguity in determining the four pulse vector in a theory of the type of H. Snyder (Phys. Rev. Vol 71, 1947, p 38) are given.

99. Dynamics of Matter in Condensed State

"Device for Investigating the Dynamics of Matter in a Condensed State by Inelastic Scattering of Cold Neutrons," by M. G. Zemlyanov and N. A. Chernoplekov, Institute of Atomic Energy, Academy of Sciences USSR; Moscow, Pribory i Tekhnika Eksperimenta, No 5, Sep/Oct 62, pp 40-47

A device to investigate the dynamics of matter in a condensed state by inelastic scattering of cold neutrons is described, as well as the results of measurements of neutron spectra elastically and inelastically scattering on a vanadium specimen.

100. Strong Magnetic Fields

"Strong Magnetic Fields," by V. R. Karasik, Physics Institute, Academy of Sciences USSR; Moscow, Pribory i Tekhnika Eksperimenta, No 6, Nov/Dec 62, pp 3-17

The up-to-date state of the techniques for obtaining strong magnetic fields is described. Direct current solenoids, pulsed systems, superconductive magnets, and other devices which produce magnetic fields between 10^5 to 10^6 oersteds are examined.

101. Magnetohydrodynamic Boundary Layer

"Statement of the Problem on the Magnetohydrodynamic Boundary Layer," by G. A. Lyubimov; Moscow, Prikladnaya Matematika i Mekhanika, Vol 26, No 5, 1962, pp 811-820

There is at present a rather large number of studies devoted to the various aspects of the magnetohydrodynamic boundary layer problem. The statement of the problem on the magnetohydrodynamic boundary layer for small magnetic Reynolds numbers (R_m) is given by V. J. Rossow (NACA TN 3971, 1957) and for large R_m by V. N. Zhigulev (DAN SSSR, vol 124, No 5, 1959; DAN SSSR, Vol 124, No 6, 1959). Classes of solutions of corresoonding systems of equations were investigated in the development of these studeis and concrete problems were solved. A number of general considerations and relations pertaining to the statement of the problem (several of them are contained in one form or another in previous works) is given in this paper. These considerations may be useful for various complications of the problem. For simplicity, only the boundary layer in incompressible liquid is examined.

102. Viscous Electric Conductive Gas

"Unsteady Parallel Plate Flow of a Viscous Electric Conductive Gas, Taking Into Account the Anisotropy of Conductivity," by Ya. S. Uflyand; Moscow, Prikladnaya Matematika i Mekhanika, Vol 26, No 5, 1962, pp 836-841

In recent years, the problem of magnetic hydrodynamics relating to the unstable flow of an incompressible conductive medium in a plane channel has been the object of many investigations. The transition modes arising during the movement of an ionized viscous gas between the parallel conductive plates in a given transverse magnetic field are studied.

103. Utilization of Incident Modulation of Parameters

"Application of Incident Modulation of Parameters in Cyclic Accelerators and Similar Systems," by A. A. Kolomenskiy and A. N. Lebedev; Leningrad, Zhurnal Technicheskoy Fiziki, Vol 32, No 10, Oct 62, pp 1237-1244

The movement of particles in periodic systems (for example, cyclic accelerators), parameters of which undergo small random variations in time, are investigated. These variations (fluctuations) may lead to noticeable reducation in the rate of resonance growth of betatron oscillations. At the same time, some stochastic sway of oscillations appears. Formulas which make it possible to determine the effect of the temporary fluctuations of parameters of the system and, in particular, to evaluate the possibility of their use in weakening the harmful effect of resonance in periodic systems are derived.

Optics and Spectroscopy

104. Energy Absorption in Electroluminescence

"Absorption of Energy in Electroluminescence," by A. N. Georgobiani, Ye. Yu. L'vova, and M. V. Fok; Leningrad, Optika i Spektroskopiya, Vol 13, No 4, Oct 62, pp 564-568

The problem of absorption of electric field energy during the glow of an electroluminescence capacitor excited by a sinusoidal voltage is examined. A method of measurement of instantaneous and average values of the absorption capacity is proposed. The results of measurement of the average absorption capacity are compared with the data obtained by the bridge method. Measurements of absolute energy yield of electroluminescence are conducted and an attempt was made to explain the relation between output and voltage on the basis of the concept of the mechanism of the process.

105. Distortion of S-Wave in Hydrogen Atom Ionization

"Calculation of the Distortion of an Incident S-Wave in Ionization of the Hydrogen Atom by Electrons," by V. Ya. Veldre and R. K. Peterkop; Leningrad, Optika i Spektroskopiya, Vol 13, No 4, Oct 62, pp 461-464

A partial s-cross section of ionization (both electrons after ionization in s-state) of the hydrogen atom by electrons was examined in an approximation (R. Peterkop, Izv. AN Latvian SSR, 10, 91, 1959)

where the distortion of the incident wave and the exchange was considered. Calculations were carried out in a first approximation of the method of integral equations with a variational method and in Born and Born-Oppenheimer (BO) approximations. It was found that different approximation methods give qualitatively different results.

In this work the s-cross section of ionization was calculated by an exact (within the framework of the method of distorted waves disregarding polarization and strong bonds) function of elastic scattering which was obtained by numerical integration. Here, as in the above-mentioned work, the wave function of the final state was chosen in a BO approximation.

106. Resonance Mass Spectrometer

"Resonance Mass Spectrometer With High Resolving Power," by B. A. Mamyrin and A. A. Frantsuzov, Physicotechnical Institute, Academy of Sciences USSR; Moscow, Pribory i Tekhnika Eksperimenta, No 3, May/Jun 62, pp 114-119

A mass-spectrometer which separates the ions according to the time of flight in a circular orbit in a homogeneous magnetic field is described. The resolving power of the instrument is (25 to 35) x 10^3 with dispersion of 300-500 mm at 1% of mass.

107. Difference Measurements in Spectrometers

"Difference Measurements in Multichannel Spectrometers," by A. A. Markov; Moscow, Pribory i Tekhnika Eksperimenta, No 3, May/Jun 62, pp 30-35

A method for the semiautomatic substraction of the Compton portion of high-energy components for the detection of a low-energy weak photopeak in a complex scintillation spectrum is described; a reverse calculation of the analyzer and visual indication are used. The normalization is calculated for the substraction of the background when errors in the amplitude analyzer are noted. Problems on the statistical errors of the difference spectrum are examined. Peculiarities of differenc measurements on time selectors are noted.

108. Pulse Sources of Light

"Pulsed Sources of Light," by I. S. Marshak; Moscow, Pribory i Tekhnika Eksperimenta, No 3, May/Jun 62, pp 5-21.

A short review is given of the contemporary technical applications of pulsed light sources in various branches of science and engineering. An assortment of pulse tubes developed by domestic industry is enumerated and the limiting features and pattern of changes in the working parameters during permissible changes in supply systems are described.

109. Ionization Camera

"Ionization Camera to Measure the Energy of Fast Neutrons," by A. Adam, P. Khrashko, and P. Kvittner, Central Scientific Research Institute of Physics, Hungarian Academy of Sciences; Moscow, Pribory i Tekhnika Eksperimenta, No 5, Sep/Oct 62, pp 72-76.

A proton recoil camera, designed for spectroscopy and charged by a mixture of hydrogen and argon is described. The pulsed spectra arising during the irradiation of the camera by 2.1, 2.25 and 3 Mev neutrons are determined. The resolving power at 3 Mev is approximately ±6%. The amplitude spectrum was also calculated. The discrepancy between the calculated and the experimental spectra is explained by the energy loss of neutrons in the walls of the camera and in the construction material. An approximate expression for the shape of the amplitude spectrum which is independent of the energy is given. The formula is proven experimentally for 2 to 3 Mev.

110. Electron Paramagnetic Resonance Spectrometers

"Electron Paramagnetic Resonance Spectrometers," by A. G. Semenov; Moscow, Pribory i Tekhnika Eksperimenta, No 5, Sep/Oct 62, pp 5-18

General principles for the construction of diagrams for contemporary electron paramagnetic resonance radiospectrometers are examined. Two types of radiospectrometers manufactured by industry are described. A number of diagrams for radiospectrometers described in the literature and having the greatest interest is examined. Spectrometers using the pulse method are not included in this survey.

111. Interaction and Fermi Resonance in Raman Spectra

"Intermolecular Interaction and Fermi Resonance in Combination Scattering of Light," by I. L. Babich, I. I. Kondulenko, and V. L. Strizhevskiy; Leningrad, Optika i Spektroskopiya, Vol 13, No 5, Nov 62, pp 642-648.

The influence of the interaction with the surrounding medium on Fermi Resonance, appearing in spectra of the combination (Raman) scattering, is studied theoretically and experimentally. The theoretical predictions were found to be in agreement with experimental data.

112. Broadening of Lines in Combination Scattering Spectra

"Broadening of Lines in Rotational and Rotation-Vibrational Combination Scattering in Gaseous Phase," by Yu. A. Lazarev; Leningrad, Optika i Spectroskopiya, Vol 13, No 5, Nov 62, pp 655-662.

From the broadening of lines of the pure rotational spectra the optical cross sections of molecules for pure gases CO_2, C_2H_2, CO and gas mixtures (with He, Ar, CH_4) are determined. The values obtained for the optical cross sections are compared with those calculated by the theory of Anderson. It is shown that the broadening of CO_2 and C_2H_2 lines is determined by quadrupole interaction.

113. Optical Properties of Plane-Parallel Layer

"Transmission and Reflection of a Plane-Parallel Layer in the Process of Amplification and Generation," by B. I. Stepanov and A. P. Khapalyuk; Leningrad, Optika i Spektroskopiya, Vol 13, No 5, Nov 62, pp 714-720

The properties of the plane-parallel layer with a negative coefficient of absorption under a normal drop in external radiation are investigated, using methods of wave optics with exact Maxwell equation solutions.

Electromagnetic Waves

114. Scattering of Electromagnetic Waves

"Scattering of Electromagnetic Waves on Uneven Surfaces," by V. I. Mikhaylov, Institute of Radiophysics and Electronics, Academy of Sciences Ukrainian SSR; Kiev, Ukrains'kyy Fizychnyy Zhurnal, Vol 7, No 12, Dec 62, pp 1274-1279

Formulas are obtained for the mean electromagnetic field and the radiation intensity of scattering by uneven surfaces.

115. Diffraction of Electromagnetic Waves

"A New Method for Solution of the Problem of Diffraction of Electromagnetic Waves on a Wedge of Finite Conductivity," by N. N. Lebedev and I. P. Skal'skaya; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 22, No 10, Oct 62, pp 1174-1183

A new method for solution of the problem on diffraction of electromagnetic waves on a wedge of finite conductivity is proposed.

It is shown that in the case of good conductance, when the problem allows an approximate formulation by an impedance boundary condition, the use of an integral transformation of a special type leads to a functional equation. An effective method for solution of the functional equation is worked out, and on basis of this a solution for the problem of diffraction of a plane electromagnetic wave for a wedge of different angles was found.

II. MATHEMATICS

116. Discrete Spectrum of Radial Equation of Schrodinger

"A Discrete Spectrum of a Radial Equation of Schrodinger," by L. A. Sakhnovich; Moscow, Matematicheskiy Sbornik: Novaya Seriya, Vol 58, No 4, Dec 62, pp 377-396

The author studies the equation

$$-\frac{d^2u}{dx^2}+\left[\frac{\mu(\mu-1)}{x^2}-2q(x)\right]u-\lambda u=0 \quad (\mu>1)$$

and its solution satisfying the boundary condition $u(0)=0$. Equations of this type are frequently encountered in problems of physics; in particular, when $q(x)=\frac{A}{x}$ $(A>0)$, the equation for the radial part of a wave function of the hydrogen atom is obtained.

The main purpose of the article is to find the smallest eigenvalue $\varphi(\mu)$ in the given problem for increasing μ and the corresponding eigenfunction $u(x,\mu)$.

117. Approximations of Functions in Spaces L^p and C on a Torus

"Approximations of Functions in Spaces L^p and C on a Torus," by B. S. Mityagin; Moscow, Matematicheskiy Sbornik: Novaya Seriya, Vol 58, No 4, Dec 62, pp 397-414

The article concerns a method of approximating functions of several variables, based on theorems for multipliers of Fourier series. The best approximations of the compacts $_p = \{u: |Pu|_C \le 1\}$ in space C are obtained for a trigonometric system. P is the differential operator

$$P\left(\frac{\partial}{\partial x}\right)=\frac{\partial^{l_1+\ldots+l_N}}{\partial x_1^{l_1}\cdot\ldots\cdot\partial x_N^{l_N}}.$$

Submitted on 19 June 1961.

118. Fourier Transform in L^2 with a Weight

"A Fourier Transform in L^2 $(-\infty, \infty)$ With a Weight," by V. P. Gurariy; Moscow, Matematicheskiy Sbornik: Novaya Seriya, Vol 58, No 4, Dec 62, pp 439-452.

The article concerns the Hilbert space of functions $L^2_\varphi(-\infty, \infty)$ in which the scalar product is defined by the relation $(f,g)=\int_{-\infty}^{\infty}\frac{f(x)\,\overline{g(x)}}{\varphi(x)}\,dx$, where the weight $\varphi(x)$ is a positive function along the real axis. The discussion is in three parts:

1. A generalization of the Paley-Wiener theorem (Fourier Transforms in the Complex Domain, by R. Paley and N. Wiener, New York, 1934).

2. Questions of interpolation and completeness in the space H^{σ}, which consists of the integral functions of degree less than or equal to σ belonging to L_2.

3. Completeness of the system of polynomials in H^{0}.

Submitted on 1 July 1961.

119. Complete Surfaces With Negative Curvature

"Complete Surfaces of Negative Curvature $K \leq -1$ in Euclidean Spaces E_3 and E_4," by E. R. Rozendorn; Moscow, Matematicheskiy Sbornik: Novaya Seriya, Vol 58, No 4, Dec 62, pp 453-478

The author investigates complete 2-dimensional surfaces with Gaussian curvature $K \leq -1$ in n-dimensional Euclidean spaces E_N. His findings may be summed up in the following two theorems:

1. There exists in E_3 a complete, smooth surface with Gaussian curvature $K \leq -1$. Everywhere, excluding a finite number of points, this surface is infinitely differentiable, and at singular points it has a generalized gaussian curvature as defined by A. D. Aleksandrov.

2. There exists in E_4 a closed surface of class C^{∞} with Gaussian curvature $K \leq -1$.

Submitted on 26 October 1961.

120. Approximations of Functions by Rational Fractions

"Approximation of Functions, Defined on the Entire Axis, by Rational Fractions," by V. N. Rusak; Minsk, Izvestiya Akademii Nauk B lorusskoy SSR: Seriya Fiziko-Tekhnicheskikh Nauk, No 4, 1962, pp 23-29

The article is devoted to the study of the approximation of functions, defined on the entire real axis, by rational fractions with fixed poles. Lagrange interpolation by rational fractions and the speed of convergence of a Bernstein type of interpolating fraction are discussed.

121. Nonautomomous Mathematical Pendulums

"A Theory of Nonautonomous Mathematical Pendulums," by V. N. Shevelo and V. G. Shtelik; Kiev, Ukrainskiy Matematicheskiy Zhurnal, Vol 14, No 4, 1962, pp 372-382

The authors consider various approximations for the mathemations for the mathematical model of a nonlinear, nonautonomous pendulum from the standpoint of oscillation, increase and damping of the amplitude, and stability of the position of equilibrium. A classification of the motions is presented.

122. Asymptotic Behavior of Linear Systems for Case of Multiple Roots of Characteristic Equation

"Asymptotic Behavior of Linear Systems for the Case of Multiple Roots of the Characteristic Equation," by N. I. Shkil'; Kiev, Ukrainskiy Matematicheskiy Zhurnal, Vol 14, No 4, 1962, pp 383-391

The results obtained by the author in a previous paper (DAN USSR, 123, 1958) are generalized. An algorithm is given for finding a special asymptotic solution of the system of linear differential equations

$$\frac{dx}{dt} = A(\tau,\varepsilon)x + \varepsilon B(\tau,\varepsilon)e^{i\theta}$$

for the case in which one of the roots of the characteristic equation possesses constant K-multiplicity, and the function $i\nu(\tau)$ becomes equal to it at isolated points of the segment $0 \leq \tau = \varepsilon t \leq L$, where ε is a small, real parameter. The author terms this the "resonance" case.

Submitted on 17 December 1960.

123. Probability Density of Transfer for Stochastic Equations of Higher Order

"The Probability Density of Transfer for Solutions of Higher Order Stochastic Equations," by Kan Chan-Ch'uan; Kiev, Ukrainskiy Matematicheskiy Zhurnal, Vol 14, No 4, 1962, pp 393-397

Stochastic higher order differenctial equations, as well as first order differential equations, studied by K. Ito ("On a Stochastic Differential Equation," Mem. Amer. Math. Soc., 4, 1951), are considered. Depending upon certain assumptions, the existence of the probability density of transfer for the solution of a stochastic equation is established; and an expression is found for this density in the form of the mathematical expectation of some functional of a wiener process. This is similar to a problem for the univariate case considered by A. V. Skorokhod ("Closely Clustered Distribution of Solutions of Stochastic Equations," Visnik KDU, No 3, Issue 1, 1961).

Submitted on 9 May 1961.

124. Nonlinear Oscillation With Random Disturbances

"The Study of Nonlinear Oscillatory Systems With Many Degrees of Freedom in the Presence of Random Disturbances," by V. G. Kolomnets; Kiev, Ukrainskiy Matematicheskiy Zhurnal, Vol 14, No 4, 1962, pp 407-411

The behavior of the amplitude and phase of an oscillatory system is studied for the case in which the system is influenced by uniform, random disturbances, such that the variation in amplitude and phase occurs as a Markov process.

125. Theory of Numbers

"The Number of Groups of Prime Number and Prime Numbers in Exponential Form," by V. A. Golubev; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy: Matematika, No 6, 1962, pp 28-33

Using the relation

$$\frac{x+b}{a} = \frac{x+b}{na} + \frac{x+b+a}{na} + \frac{x+b+2a}{na} + \ldots + \frac{x+b+a(n-1)}{na},$$

where a b 0 are given integers and x 0 is a real variable, the author makes a study of prime numbers and prime numbers in exponential form. The article is three parts: (1) properties of the function x, (2) the number of prime pairs from 1 to x, and (3) the number of prime pairs from 1 to x, and (3) the number of prime numbers of the form $x^2 + 1$.

"Evaluation of a Sum of Prime Numbers" (presented on 19 December 1961 by Academician I. M. Vinogradov), by G. I. Perel'muter; Moscow, Doklady Akademii Nauk SSSR, Vol 144, No 1, 1 May 62, pp 48-51

I. M. Vinogradov (Izbr. Tr., Moscow, 1952, p 305) has indicated the possibility of evaluating the sum $S = \sum_{p \leq N} \chi [f(p)]$, where x is a secondary character prime modulo q and f(p) is an integral polynomial. In this article, the evaluation of the sum S is put into more general form $\sum_{p \leq N} \chi[R_1 (p)] \exp[\frac{2\pi i}{q} R_2 (p)]$, where $R_1 (p)$ and $R_2 (p)$ are rational functions modulo q.

126. Group Theory

"Two Theorems on Solvable Groups," by P. T. Kozel and R. I. Tyshkevich, Belorussian State University imeni V. I. Lenin: Kazan', Izvestiya Vysshikh Uchebnykh Zavedeni; Matematika, No 6, 1962, pp 45-50

The authors prove two theorems on solbable groups which supplement two theorems of D. A. Suprunenko on solvable groups of matrices:

"THEOREM 1. Assume Γ to be a maximum solvable, primative subgroup of GL(n, P) whose center coincides with a multiplicative group of field P; F to be a maximum Abelian, normal divisor of Γ; anf V to be the centralizer of F in Γ. Then F is a multiplicative group of some field KCP_n, appearing as a normal extension of field P with a solvable Galois group. The factor-group. the factor-group Γ/V is isomorphic to the Galois group of field K relative to P. $\Gamma:V = K:P$.

"THEOREM 2. Assume Γ to be a maximum irreducible, solvable subgroup of GL(n, P), where P is a finite fiels. Then Γ possesses only one maximum Abelian, normal divisor."

Submitted on 17 October 1959.

127. Classes and Complexes of the Subgroup of Finite Groups

"Classes and Complexes of Subgroups of Finite Groups" (presented by Academician A. I. Mal'tsev, 28 May 62), by V. I. Sergiyenko, Gomel' Branch of the Institute of Mathematics and Computer Engineering, Academy of Belorussian SSR; Moscow, Doklady Akademii Nauk SSSR, Vo 146, No 6, 21 Oct 62, pp 1279-1281

The author studies a large number of classes and complexes of subgroups possessing one or more defined properties at the same time. The complementary properties of these subgroups are also investigated. For example, it is shown that an unsolvabel group has τ (the number of distinct simple divisors of the order of the group) unattainable subgroups which are at the same time nonspecial and solvable and each order of which is separated from the others by not more than three different prime numbers.

128. Problem of Submersion in Group Theory

"A Secondary Obstruction in the Problem of Submerging Fields of Algebraic Numbers," by S. P. Demushkin and I. R. Shafarevich; Moscow, Izvestiya Akademii Nauk SSSR: Seriya Matematicheskaya, Vol 26, No 6, Nov/Dec 62, pp 911-924

The problem of submerging fields of algebraic numbers in a field with a large Galois group is studied. A secondary obstruction to the solvability of the problem of submersion is calculated.

Submitted on 1 August 1961.

129. Decomposition of Π-Solvable Groups Into Direct Product of Subgroups

"Decomposition of Π-Solvable Groups Into the Direct Product of Subgroups" (presented by Academician I. M. Vinogradov, 23 Jun 1962), by S. A. Chunikhin, Gomel' Branch of the Institute of Mathematics and Computer Engineering, Academy of Sciences Belorussian SSR; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 5, 11 Dec 62, pp 1042-1044

In several previous papers (DAN, 55, No 6, 1947, p 481; and others), the author discussed p-solvable and more general Π-solvable groups. In this paper, he establishes a method for the decomposition of Π-solvable groups into the direct product of a subgroup, formed by means of the concept of S-connectivity of simple divisors of the order of the group.

130. Analytic Functions in Non-Archimedean Normalized Fields

"Behavior of Analytic Functions in Non-Archimedean Normalized Fields," by D. N. Lenskoy, Saratov State University imeni N. G. Chernyshevskiy; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy: Matematika, No 6, 1962, pp 62-68

The article concerns some new findings on the behavior of the norm of any analytic function of the form $f(x) - \sum_{n=0}^{n} a_n (x - x_0)^n$ and the distribution of its a-points in a complete, algebraically closed, non-Archimedean, normalized field.

Two problems in particular are studied: (1) the existence of an integral function in a locally compact subfield k of the field under investigation which is not constant and bounded on all of k; (2) finding the upper bound for the number of a-points of a meromorphic function in the set $|x| \geq r$, where $r = |x - x_0|$. Some generalizations on the behavior of the lower bound of this quantity are made. Certain special cases are considered.

131. Method for Finding Bounds of Region of Convergence of Periodic Series

"A Method for Finding the Bounds of the Region of Convergence of Periodic Series for Solutions of Quasilinear Differential Equations With a Small Parameter. The Resonance Case," by Yu. A. Ryabov, All-Union Power Engineering Correspondence Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy: Matematika, No 6, 1962, pp 108-118

The article is a continuation of two pervious articles by the author (DAN SSSR, Vol 118, No 4, 1958, pp 642-645; Izv. Vuzov, Matem., No 2 (9), 1959, pp 202-211). Based on an idea of A. M. Lyapunov, a method is presented for finding the bounds of the region of convergence of a series for the periodic solution of a system of quasilinear differential equations found by the method of a small parameter. A number of examples are given for illustration, including the so-called "resonance case," which was presented without comment in the second of the articles referred to above.

132. Derivation of Limiting Cycles

"The Problem of the derivation of Limiting Cycles," by A. Ya. Khokhryakov, Udmurt State Pedagogical Institute; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy: Matematika, No 6, 1962, pp 145-147

The author discusses the problem of deriving limiting cycles from a limiting cycle of the differential equation

$$y' = f(x, y, \lambda) = \frac{P(x, y, \lambda)}{Q(x, y, \lambda)},$$

where λ is a parameter and P and Q are functions possessing continuous derivatives of necessary (but finite) orders with respect to all arguments.

Submitted on 26 October 1959.

133. General Formulation of Best Approximation Problem

"A General Formulation of the Problem of the Best Approximation" (presented by Academician A. N. Kolmogorov, 22 December 1961), by Ye. G. Gol'shteyn; Moscow, Doklady Akademii Nauk SSSR, Vol 144, No 1, 1 May 62, pp 21-22

Given a real space E_i $(i = 1, 2, 3)$, a closed subspace H of E_1, and a linear operator A_i acting from H to F_{i+1} $(i = 1, 2)$, the author considers the following problem for the best approximation of the element $x_0 \notin E_1$:

Determine the element x* for which $\inf |x_0 - x|$ is attained, in attained, in which the lower bound is preserved depending on the elements x which satisfy the limitations $x \in H$, $A_1 x \geq b_1$, and $A_2 x = b_2$, where $b_i \in E_{i+1}$ $(i = 1, 2)$. It is assumed that x_0 does not belong to the closure of the set of points x.

A theorem similar to Chebyshev's is presented which gives the necessary and sufficient conditions to make $\inf \| x_0 - x \|$ a minimum, with the given limitations.

134. Approximation of Functions by Asymptotic Polynomials

"Approximation of Functions by Asymptotic Polynomials," by I. I. Ete: man, Penzenskiy Polytechnic Institute; Kazan;, Izvestiya Vysshikh Uchebnykh Zavedeniy: Matematika, No 6, 1962, pp 162-171

The classical theorem of asymptotic expressions of polynomials of the best approximation stems from the work of S. N. Bernstein. This paper presents another approach to the study of the asymptotic behavior of approximating polynomials which are natural from the point of view of applied analysis.

Asymptotic matrices are studied by means of the fuction $f(x)$, expressed as the Chebyshev polynomial $f(x) = \sum_{n=0} c_n T_n(x)$, which converges uniformly in the interval $-1 \leq x \leq +1$. The author also studies the properties of asymptotic polynomials, using as an example the system $(-1)^k \gamma E_n + P_n(\xi_k) = f(\xi_k)$, $f'(\xi_k) - P'_n(\xi_k) = 0$, $(K = 0, \ldots, n+1)$, which defines for a given function $f(x)$ a polynomial of least deviation $P_n(x)$ and best approximation E_n and alternating points $\{\xi_i\}$.

Submitted on 4 October 1960.

135. Linear Integral-Differential Equations With Small Parameter

"Systems of Linear Integral-Differential Equations With a Small Parameter," by N. P. Vekua (Academician of Academy of Sciences Georgian SSR), Tbilisi Mathematical Institute imeni A. M. Razmadze; Tbilisi, Soobshcheniya Akademii Nauk Gruzinskoy SSR, Vol 29, No 4, Oct 62, pp 385-391

The article concerns the integral-differential equations of the form

$$\varepsilon \frac{dy(\varepsilon,t)}{dt} + b(\varepsilon,t)\, y(\varepsilon,t) + \int_0^t K(\varepsilon,t,\tau)\, y(\varepsilon,\tau)\,d\tau = f(\varepsilon,t),$$

$$\frac{dy(\varepsilon,t)}{dt} + b(\varepsilon,t)\, y(\varepsilon,t) + \int_0^1 K(\varepsilon,t,\tau)\, y(\varepsilon,\tau)\,d\tau = f(\varepsilon,t),$$

where ε is a small parameter ($\varepsilon > 0$) and $K(\varepsilon,t,\tau)$ is a matrix

$$K(\varepsilon,t,\tau) = \|K_{ij}(\varepsilon,t,\tau)\| \quad (i,j = 1,2,..,n)$$

which can be given as $K(\varepsilon,t,\tau) = K(t,\tau) + O(\varepsilon)$.

Two theorems are presented which show that in the limiting case for $\epsilon \to 0$, $t > 0$, the solution of the given equations K_ϵ can be expressed in terms of the reduced equations

$$ay(t) + \int K(t,\tau)\, y(\tau)\, d\tau = f(t),$$

$$ay(t) + \int K(t, \,)\, y(\,)\, d\tau = f(t).$$

136. Method of Fourier for Solution of Second-Order Differential Equations

"A Method of Fourier for Differential Equations Containing Second Derivatives With Respect to Time" (presented by Academician I. G. Petrovskiy, 18 May 1962), by N. I. Brish and I. N. Valeshkevich, Belorussian State University imeni V. I. Lenin; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 6, 21 Oct 62, pp 1247-1250.

The authors assume in the bounded region Ω of the space $x=(x_1,\ldots,x_N)$ the self-conjugate differential operator $Au = \sum_{|\alpha|=|\beta|\le m} (-1)^{|\alpha|} D^{\alpha}(a_{\alpha\beta}(x)D^{\beta}u)$, where $\alpha=(\alpha_1,\ldots,\alpha_N)$, $|\alpha|=\alpha_1+\ldots+\alpha_N$, $D^{\alpha}=\partial^{\alpha}\partial x_1^{\alpha_1}\ldots\partial x_N^{\alpha_N}$, $a_{\alpha\beta}(x)$ are real functions in Ω.

They then consider the equation $Au + \frac{\partial^2 u}{\partial t^2} = f(x, t)$ in the cylinder $Q = \Omega \times (0,T)$, satisfying the conditions $u|_{t=0} = \varphi(x)$, $\frac{\partial u}{\partial t}|_{t=0} = \psi(x)$, $\frac{\partial^k u}{\partial \nu^k}|_{\Gamma} = 0$ $(k = 0,1, \ldots, m-1)$, where $\Gamma = S \times [0, T]$ is a lateral surface of Q and ν is an exterior normal to Γ. The solvability of the equation is proven by a method of Fourier.

137. Variability of Solutions of Ordinary Differential Equations

"The Variability of Solutions of Certain Ordinary Differential Equations" (presented by Academician I. G. Petrovskiy, 20 December 1961), by I. T. Kiguradze; Moscow, Doklady Akademii Nauk SSSR, Vol 144, No 1, 1 May 62, pp 33-36

The article deals with the differential equation $\frac{d^N u}{dt^N} + F(u^2,t)u = 0$, where n 2 and the function f(y,t) is continuous for 0 t,y ∞ and satisfies the conditions: F(y,t) 0; F(y1,t) 0; F(y1,t) F(y2,t), when y1 y2. The equation is said to be strictly nonlinear if, in addition to the above conditions, F(y,t), for large y, satisfies the condition $\frac{F(y^{\beta},t)}{\varphi(y)} \ge F(c^{\beta},t)$, $c < 0$, where the function $\varphi(y)$ is absolutely continuous in the interval $(0, \infty)$ and $\varphi(y) > 0$, $\varphi'(y) \ge 0$, and $\int^{\infty} \frac{dy}{y\varphi(y)} < \infty$.

The Solution u(t) of the given equation is said to be "oscillatory" if it has an infinite number of roots; otherwise, it is "nonoscillatory." The author establishes several criteria for the oscillation of solutions of the equation.

138. Differential Equations in Banach Space

"Second-Order Differential Equations in Banach Space" (presented by Academician I. G. Petrovskiy, 28 March 1962), by P. Ye. Sobolevskiy, Voronezh Agricultural Institute; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 4, 1 Oct 62, pp 774-777

The problem $v'' + A(t)v' + B(t)v = f(t)$ $(0 \le t \le T)$; $v(0) = v_0$, $v'(0) = v'_0$ in Banach space is considered. The function $v(t)$ is assumed to be the solution of the problem if for all t's in $[0, T]$ it satisfies the above equation and the functions $v(t)$, $A(t)v''(t)$, and $B(t)v(t)$ are continuous in $[0, T]$.

Theorems for the existence of the solution to the given problem and also several nonlinear problems are presented in the article. An equation with a small parameter $\varepsilon > 0$ is studied for the derivative $v''(t)$, and it is shown that the solution of this problem tends toward the solution of a reduced first-order equation.

139. Differential Equations with Quasi-Periodic Coefficients

"Solutions and Regularity of Linear Systems of Differential Equations with Quasi-Periodic Coefficients" (presented by Academician S. L. Sobolev, 7 May 1962), by V. Kh. Kharasakhal; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 6, 21 Oct 62, pp 1290-1293

A special system of partial differential equations is studied, and on the basis of this study certain conditions for relatively linear systems of ordinary differential equations with quasi-periodic coefficients are determined.

Several theorems are given for the reducibility of the equation

$$\frac{\partial x}{\partial u_1} + \ldots + \frac{\partial x}{\partial u_M} = F(u_1, \ldots, u_M)x,$$

where $F = ||F_{sk}(u_1, \ldots, u_M)||_1^N$ is a matrix and $x(x_1, \ldots, x_N)$ is a vector. The functions F_{sk} and $\frac{\partial F_{sk}}{\partial u_j}$ are considered to be continuous for all values of $u_1, \ldots, u_M$.

140. Linear Partial Differential Equations With Leading Members

Criteria for the Boundedness of Solutions for Linear Partial Differential Equations Having Leading Members (presented by Academician I. G. Petrovskiy, 16 June 1962), by M. A. Rutman, Odessa Hydrometeorological Institute; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 4, 1 Dec 62, pp 789-792

This article can be considered as the final in a series by the author (DAN, 101, No 6, 1955, p 993; DAN, 108, No 5, 1956, p 770; UMN, 12, No 1, 1957, p 234; DAN, 124, No 4, 1959, p 764; Tr. Odessk. Gidrometinst., No 27, 1962, p 11) and M. G. Kreyn (UMN, 3 No 3, 1948, p 166). It concerns the differential equation

$$\frac{\partial^{p_1+p_2+\dots p_N} y}{\partial t_1^{p_1}\,\partial t_2^{p_2}\dots\partial t_N^{p_N}} - \sum_{(q_1 q_2 \dots q_N)} A_{q_1 q_2 \dots q_N} \frac{\partial^{q_1+q_2+\dots q_N} y}{\partial t_1\,\partial t_2\dots\partial t_N^{q_N}} = x$$

in the region $0 \le t_1, t_2, \dots t_N < \infty$. $y = y(t_1, t_2, \dots t_N)$; $x = x(t_1, t_2, \dots t_N)$ is a vector-function whose values lie in the Banach (complex) space E. $A_{q_1 q_2 \dots q_N} = A_{q_1 q_2 \dots q_N}(t_1, t_2, \dots t_N)$ is a family of linear operators existing in E. The first term of the left side of the equation under study is made the "leading" one. This means that $p_j \ge q_j$, $\sum_{j=1}^{N} p_j > \sum_{j=1}^{N} q_j$ for every term of $\sum_{(q_1 q_2 \dots q_N)}$.

The basic results of the article can be summed up in the following THEOREM: In the given boundary value problem, in order that each bounded right side $\sup ||x(t_1, .., t_N)|| < \infty$ satisfy the bounded solution $\sup ||y(t_1, .., t_N)|| < \infty$, it is necessary and sufficient that any operator-function $\Gamma^{(\omega)}(\lambda_1, .., \lambda_N)$ not have singular points in the region $\mathrm{Re}\,\lambda_j > 0$, $j = 1, 2, \dots, n$, in other words, in order that every singular point $\Gamma^{(\omega)}$ have at least one "coordinate" lying in the left (open) half-plane.

141. Problem of Sobolev on Partial Differential Equations

A Problem of S. L. Sobolev (presented by Academician S. L. Sobolev, 25 June 1962), by T. I. Zelenyak, Institute of Mathematics with computing center of the Siberian branch of the Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 5, 11 Dec 62, pp 1017-1019

The equation

$$\sum \frac{\partial}{\partial t}\left(a_{i,1}\frac{\partial^2 u}{\partial x^2} + a_{i,2}\frac{\partial^2 u}{\partial x^2} + b_i(x,y)\frac{\partial u}{\partial x} + c_i(x,y)\frac{\partial u}{\partial y} + d_i(x,y)\,u\right) = 0,$$

is given, where $a_{i,1}$, $a_{i,2}$ are real constants and b_i, c_i, d_i are continuous functions of their arguments in a bounded, closed region with a triply differentiable boundary Γ of positive curvature.

In a previous paper (DAN, 139, No 3, 1961), the author found a class of solutions to the equation $\frac{\partial^3}{\partial t^3}\left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}\right) + \frac{\partial^3 u}{\partial y^3} = 0$ which satisfied the condition $u|_\Gamma = 0$ and is a generalization of the solutions found in the previous paper.

142. Distribution of Points on Sphere and Differential Equations in Complex Region

"Uniform Distribution of Points on a Sphere and Ergodic Properties of Solutions to Ordinary Linear Differential Equations in the Complex Region" (presented by Academician A. N. Kolmogorov, 23 June 1962), by V. I. Arnol'd and A. L. Krylov, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 148, No 1, 1 Jan 63, pp 9-12

The authors consider problems in which a noncommutative discrete group "plays the role of time." The ergodic properties of solutions to linear differential equations in the complex region are studied. Two theorems are presented:

1. Given A and B, two rotational positions of a sphere S^2; x, a point on the sphere. If the sequence of points x; Ax, Bx; A^2x, ABx, BAx, B^2x;...is everywhere dense on the sphere S^2, then it is uniformly distributed.

2. Given the hypergeometric equation of Gauss

$$z(1-z)\frac{d^2x}{dz^2} + [\gamma - (\alpha+\beta+1)z]\frac{dx}{dz} - \alpha\beta x = 0,$$

in which the parameters α, β, and γ are real. This equation has a single-valued first integral $b_{11}x\bar{x} + b_{12}x\bar{x}' + b_{21}x'\bar{x} + b_{22}x'\bar{x}' = \text{const.}$, where $x' = dx/dz$ and $b_{ij}(z)$ is a single-valued (but not complexanalytic) function, defined for $z \neq 0, 1, \infty$ and generating a self-conjugate matrix $\|b_{ij}(z)\|$.

143. Dependence of Solution to First Boundary Value Problem on Initial Data

"Continuous Dependence on the Initial Data of the Solution to the First Boundary Value Problem for a Parabolic Equation With Negative Time" (presented by Academician I. G. Petrovskiy, 30 June 1962), by R. Ya. Glagoleva, Moscow Aviation Institute imeni S. Ordzhonikidze; Moscow, Doklady Akademii Nauk SSSR, Vol 148, No 1, 1 Jan 63, pp 20-23

The parabolic equation

$$\frac{\partial u}{\partial t} = \sum_{j,k=1}^{n} \frac{\partial}{\partial x_j}\left[a_{jk}(x_1,\ldots,x_n)\frac{\partial u}{\partial x_k}\right] + c(x_1,\ldots,x_n)u + f(t,x_1,\ldots,x_n)$$

is studied. R is a cylinder in (n+1)-dimensional space $(t,x_1,\ldots,x_n)$ with the generatrix parallel to the t-axis. The upper and lower bases of R lie in the hyperplanes $t = 0$ and $t = -T$, respectively. It is shown that in the class of solutions uniformly bounded in R, there is a continuous dependence on the initial function, and the solution will vary, depending on the change of the initial function and constants of the limiting solution.

144. Solvability of Dirichlet Problem for Elliptic Equations

"Criteria for the Solvability of the Dirichlet Problem for Elliptic Equations" (presented by Academician I. G. Petrovskiy, 4 July 1962), by S. I. Khudyayev, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 148, No 1, 1 Jan 63, pp 44-46

The Dirichlet problem $u|_S = \varphi(x)$ is given for the quasilinear elliptic equation $L(u) \equiv \sum a_{ij}(x,u)u_{x_ix_j} + \sum a(x,u) = 0$, with boundary S. Criteria are found for the solvability of this problem which are not connected with the limitations on the function $a(x,u)$. Based on these criteria, an analysis of the Dirichlet problem is made for a simple, but practical and important equation.

145. Algorithms for Calculating Monotonic Functions of Logic Algebra

"Certain Algorithms for Calculating Monotonic Functions of Logic Algebra" (presented by Academician S. L. Sobolev, 25 June 1962), by V. K. Korobkov and T. L. Reznik, Institute of Mathematics with the computing center of theSiberian branch of the Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 5, 11 Dec 62, pp 1022-1025

In defining functions of logic algebra, it is possible to consider the set E_N as the set of vertices of an n-dimensional unit cube. In the general case, for a single-valued definition of a function of logic algebra $f(x_1,x_2,\ldots x_N)$ it is necessary to know the value of the function at each point of E_N. If the function belongs to some class, then with additional information it is sufficient to know the value of the function at some subset of E_N in order that it be possible to define it uniquely on all of E_N. Thus, calculating the value of the function $f(x_1,x_2,\ldots x_N)$ at the set of points $G(s) = \{(\alpha_1^k,\alpha_2^k,\ldots,\alpha_N^k)\}$, such that $\sum_{i=1}^{N} \alpha_i^k = k \quad (0 \le k \le n)$, it is possible to separate ("decipher") any particular function from the class of symmetric functions (defined by S. V. Yablonskiy in Problemy Kibernetiki, No 2, Moscow, 1959, p 75) of logic algebra.

A number of problems in mathematical economics and logic reduce to "deciphering" monotonic functions (defined by the same author in Tr. Matem. Inst. imeni V. A. Steklov AN SSSR, 51, 1958, p 5) of logic algebra in which the computation of the value of the function at each point is extremely cumbersome. In this article, the authors discuss the algorithmic difficulty of "deciphering" monotonic functions in a certain class of natural algorithms.

146. Discrete Part of Laplacian Spectrum Limited by Cylindrical Regions

"The Discrete Part of a Laplacian Spectrum Limited by Cylindrical Regions" (presented on 16 June 1962 by Academician S. N. Bernshteyn), by I. M. Glazman and B. Ya. Skachek, Khar'kov Polytechnic Institute imeni V. I. Lenin; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 4, 1 Dec 62, pp 760-763

Given: $-\tilde{\Delta}$, a self-conjugate operator defined by a bivariate Laplacian, $-\Delta$; and α, the first eigenvalue of a boundary value problem defined by the Laplacian in the part of the plane $z = 0$ bounded by the curve $r = r(\varphi)$ $(0 \le \varphi < 2\pi)$.

The purpose of the article is to find the conditions to which an infinite perturbation $\delta(z)$ should be subjected in order to ensure either a finite or infinite number of α's. A study is also made of the asymptotic distribution of the eigenvalues of the operator $-\tilde{\Delta}$ in the left half-neighborhood of the point α. The concluding part of the article is devoted to certain related problems arising in connection with the foregoing.

147. Fundamental Solutions of Parabolic Equations

"The Fundamental Solution of the Parabolic Equation" (presented by Academician I. G. Petrovskiy, 18 June 1962), by A. M. Il'in, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 4, 1 Dec 62, pp 768-771

The article concerns the fundamental solution $G(t,\tau,x,\xi)$ which satisfies the parabolic equation

$$\frac{\partial u}{\partial t} = \sum_{i,j=1}^{N} a_{ij}(t,x) \frac{\partial^2 u}{\partial x_i \partial x_j}, \quad x = (x_1, x_2, \ldots x_N) \in E_N$$

for variables t,x. The solution $u_\tau(t,x)$ of this equation, with initial condition $u_\tau(\tau,x) = \varphi(x)$, is presented in the form

$$u_\tau(t,x) = \int_{E_N} G(t,\tau,x,\xi)\,\varphi(\xi)\,d\xi.$$

It is shown that if only the continuity of the coefficients of the given equation are required, then, generally speaking, it is simpossible to expect to obtain a solution of the given equation in the form presented above when the function $G(t,\tau,x,\xi)$ is limited only by $t - \tau > \delta > 0$.

148. Linear Filters

"A General Theory of Linear Filters" (presented by Academician V. I. Smirnov, 9 June 1962), by N. S. Landkof; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 4, 1 Dec 62, pp 776-778

A linear filter Φ is a device which transforms an "input" $x(t)$ into an "output" $y(t)$ according to the formula $y(t) = \int_{-\infty}^{\infty} x(t-\tau)\,dU(\tau)$. The function $U(t)$ is called "transient" if the reaction of the filter on a single input $x(t) = 1(t)$.

The filter Φ is called "stable" if $\int_{-\infty}^{\infty} |dU(\tau)| < \infty$, i.e., if the variation of $U(t)$ is bounded on the entire axis. A modification of the latter relation leads to the definition of "weakly stable" filters. Several theorems for stable and weakly stable filters are given.

149. Elliptic Equations with Discontinuous Coefficients

"Equations of an Elliptic Type With Discontinuous Coefficients" (presented on 21 May 1962 by Academician S. L. Sobolev), by Ya. A. Roytberg and Z. G. Sheftel', Stanislav Pedagogical Institute and Drogobych Pedagogical Institute; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 6, 21 Oct 62, pp 1275-1278

Boundary value problems for equations with discontinuous coefficients are studied by functional methods; an inequality is established for Sobolev classes of functions satisfying given boundary conditions which guarantee the existence of a generalized solution. The smoothness of the generalized solution as far as the surface of discontinuity and boundary is found by a method similar to that of Nirenberg (Comm. Pure and Appl. Math., 8, No 4, 1955). Problems in eigenvalues are studied by these same methods. The article deals with the case of second-order equations, but the method can be extended to higher-order equations.

150. Differential Operators in Hypoelliptic Equations

"Differential Properties of Solutions of Stable Hypoelliptic Equations" (presented on 25 Dec 1961 by Academician P. S. Aleksandrov), by P. P. Mosolov; Moscow, Doklady Akademii Nauk SSSR, Vol 144, No 1, 1 May 62, pp 44-47

The author discusses the differential operator

$$q\left(x, \frac{\partial}{\partial x}\right) = \sum_{\alpha} a_{\alpha_1 \ldots \alpha_N}(x) \frac{\partial^{\alpha_1 + \ldots + \alpha_N}}{\partial x_1^{\alpha_1} \ldots \partial x_N^{\alpha_N}}$$

when the coefficients of the operator are sufficiently smooth functions. Two theorems are presented for coefficients of stable hypoelliptic operators.

151. Analytic Solutions of Essentially Nonlinear Equations

"Analytic Solutions of Essentially Nonlinear Equations" (presented on 25 December 1961 by Academician V. I. Smirnov), by A. Ye. Gel'man, Leningrad Electrical Engineering Institute imeni V. I. Lenin; Moscow, Doklady Akademii Nauk SSSR, Vol 144, No 1, 1 May 62, pp 19-20

The author considers the situation in which essentially nonlinear equations have analytic solutions, the number of them is determined, and a dominant series is formed. An example is given of a vector-analytic function f(V, t), the coefficients of the series for which

are 2π-periodic functions of t. The average values of the coefficients are substituted into the equation $\bar{f}(V) = 0$. It is shown that if this equation has exactly n solutions $V_1, V_2, \ldots, V_N$, then (1) the differential equation $\dot{V} = \lambda f(V, t)$, for sufficiently small $|\lambda|$, also has exactly n 2π-periodic solutions $V_1(\lambda), V_2(\lambda), \ldots, V_N(\lambda)$ which reduce to a series of degree λ; and (2) the radius of convergence R_j of the series $V_j(\lambda)$ is greater than or equal to an expression involving a dominant series for some function of the vector.

152. Basic Equations in Theory of Surfaces

"The Study of Solutions of Basic Equations in the Theory of Surfaces" (presented on 22 December 1961 by Academician A. N. Kolmogorov), by V. T. Fomenko, Rostov-on-Don State University; Moscow, Doklady Akademii Nauk SSSR, Vol 144 No 1, 1 May 62, pp 69-71

Solutions w(z) of Gauss and Codazzi for surfaces of positive curvature are studied. A general formula for the solution of these equations is obtained, and it is shown that between the functions w(z) and analytic functions there exists a one-to-one correspondence. A nonlinear boundary value problem for the Gauss and Codazzi system of equations is considered and its exact formulation is given. With the aid of the aforementioned formula, the problem reduces to finding an analytic function. A nonlinear boundary value problem for a linear problem of Hilbert is shown to be unsolvable.

153. Distribution of Systems of Fractional Parts of Polynomials

"Distribution of Systems of Fractional Parts of Several Polynomials," by I. M. Vinogradov; Moscow, Izvestiya Akademii Nauk SSSR: Seriya Matematicheskaya, Vol 26, No 6, Nov/Dec 62, pp 793-796

A theorem is given which characterizes the distribution of systems of the fractional parts of several n-th degree polynomials of the same variable, the latter taking on the values of a given increasing sequence of positive integers.

154. Expansion in Quasi-Power Series

"Criteria for Expansion of Functions in Quasi-Power Series and Quasi-Analytic Classes of Functions," by G. V. Badalyan; Moscow, Izvestiya Akademii Nauk SSSR: Seriya Matematicheskaya, Vol 26, No 6, Nov/Dec 62, pp 839-864

The article concerns a generalization of the Taylor series by the author. Infinitely differentiable functions are classified in a new way when, together with the increase of the coefficients of the derivatives of functions of this type, their interdependence is taken into consideration. The necessary and sufficient condition for the quasi-analyticity (in the Carleman sense [Les Fonctions quasi Analytiques, by T. Carleman, Paris, Gauthier-Villars et Cie., 1926]) is obtained for the classes of functions studied. A finite solution to the Carleman problem concerning quasi-analytic classes of functions is found by an analogy to the Taylor series.

Submitted on 24 April 1961.

155. Algebraic Independence of the Values of E-Functions

"The Transcendentality and Algebraic Independence of Values of E-Functions Which Are Related to Any Number of Algebraic Equations in the Field of Rational Functions," by A. B. Shidlovskiy; Moscow, Izvestiya Akademii Nauk SSSR: Seriya Matematicheskaya, Vol 26, No 6, Nov/Dec 62, pp 877-910

General theorems are established on the transcendentality and algebraic independence of values at algebraic points of E-functions (defined in Transcendental Numbers, by C. Siegel, Princeton, 1949; by the author in "Criteria for Algebraic Independence of Values of a Class of Integral Functions," Doklady Akademii Nauk SSSR, 100, No 2, 1955, pp 221-224; and others) which are solutions of linear differential equations with polynomial coefficients and related to any number of algebraic equations in the field of rational functions.

156. Bounds of Parameters of Gaussian Markov Process

"The Bounds of Parameters of a Complex Stationary Gaussian Markov Process," by M. Arato, Academician A. N. Kolmogorov, and Ya. G. Sinay, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 4, 1 Oct 62, pp 747-750

The article deals with a bivariate stationary random process whose components $\xi(t)$ and $\eta(t)$ satisfy the stochastic differential equations

$$d\xi = -\lambda\xi dt - \omega\eta dt + d\varphi,$$

$$d\eta = \omega\xi dt - \lambda\eta dt + d\psi,$$

where $\varphi(t)$ and $\psi(t)$ are two independent Wiener processes. Variations in the earth's rotation are studied from a probability standpoint.

157. Game Theory

"Reduction of a Game With Perfect Recall to a Matrix Game" (presented by Academician V. I. Smirnov, 25 December 1961), by I. V. Romanovskiy, Leningrad State University imeni A. A. Zhdanov; Moscow, Doklady Akademii Nauk SSSR, Vol 144, No 1, 1 May 62, pp 62-64

The solution of finite, two-person, zero-sum games with perfect recall is considered. It is known that any finite game can be normalized, and the problem here is to take advantage of games with perfect recall, based on the theory of H. W. Kuhn on behavior strategy. The problem of finding optimal behavior strategies is reduced to the solution of a matrix game with limitations which, in essence, becomes a problem in linear programming.

III. CONFERENCES

158. Second All-Union Symposium on Wave Diffraction

"Second All-Union Symposium on Wave Diffraction," by B. D. Tartakovskiy; Moscow, Uspekhi Fizicheskikh Nauk, Vol 78, Issue 4, Dec 62, pp 701-721

The second all-union symposium on wave diffraction was held from 4 to 9 June 1962 in Gor'kiy. It was convened by the Commission on Acoustics of the Academy of Sciences USSR, together with the scientific-research institute of radio physics under the Gor'kiy State University imeni N. I. Lobachevskiy.

159. Recent Soviet Conference on Physics, Geophysics, and Astronomy

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. It is assumed that there was no non-Soviet participation in the conferences.

a. 12th Annual Conference on Nuclear Spectroscopy; 26 January-2 February 1962, Leningrad. (Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, Vol 26, No 12, 1962, entire issue)

b. 11th Annual Conference on Luminescence; 10-15 September 1962, Minsk; probably sponsored by the Scientific Council on Luminescence. (Vestnik Akademii Nauk SSSR, No 12, Dec 62, p 99)

c. Symposium of the Glaciology Section of the Interdepartmental Geophysical Committee; 25 June-5 July 1962, Alma-Ata. (Vestnik Akademii Nauk SSSR, No 12, Dec 62, p 104)

d. All-Union Astronomical Conference on the Study of Small Bodies of the Solar System; 9-13 October 1962, Baku; probably sponsored by the Institute of Theoretical Astronomy of the Academy of Sciences USSR. (Vestnik Akademii Nauk SSSR, No 1, Jan 63, p 126)

e. Symposium on Problems of Nonstationary (Variable) Stars; 6-8 September 1962, Crimean Astrophysical Observatory; participation by members of the executive committee of the International Astronomical Union. (Vestnik Akademii Nauk SSSR, No 1, Jan 63, p 124)

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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,

Nancy Dorfeld Sc for

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
AD0333357	78-03117A	187	1	24	4083	Scientific Information Report Organization And Administration Of Soviet Science (6)	12/4/1962	94	Approved For Release	3/29/2004
AD0333955	78-03117A	190	1	20	4197	Scientific Information Report Organization And Administration Of Soviet Science (7)	1/15/1963	100	Approved For Release	3/29/2004
AD0334986	78-03117A	194	1	1	4341	Scientific Information Report Organization And Administration Of Soviet Science (8)	3/5/1963	129	Approved For Release	3/29/2004
AD0335307	78-03117A	196	1	2	4421	Scientific Information Report Organization And Administration Of Soviet Science (9)	3/19/1963	85	Approved For Release	3/29/2004
AD0336305	78-03117A	199	1	14	4550	Scientific Information Report Organization And Administration Of Soviet Science (10)	4/24/1963	99	Approved For Release	3/29/2004
AD0337360	78-03117A	203	1	2	4702	Scientific Information Report Organization And Administration Of Soviet Science (11)	6/13/1963	65	Approved For Release	3/29/2004
AD0338686	78-03117A	205	1	41	4816	Scientific Information Report Organization And Administration Of Soviet Science (12)	7/18/1963	67	Approved For Release	3/29/2004
AD0342004	78-03117A	208	1	24	4913	Scientific Information Report Organization And Administration Of Soviet Science (13)	8/21/1963	89	Approved For Release	3/29/2004
AD0343882	78-03117A	211	1	15	5033	Scientific Information Report Organization And Administration Of Soviet Science (14)	9/24/1963	127	Approved For Release	3/29/2004
AD0343989	78-03117A	213	1	12	5111	Scientific Information Report Organization And Administration Of Soviet Science (15)	10/18/1963	58	Approved For Release	3/29/2004
AD0345283	78-03117A	215	1	21	5180	Scientific Information Report Organization And Administration Of Soviet Science (16)	11/18/1963	61	Approved For Release	3/29/2004
AD0344526	78-03117A	217	1	34	5255	Scientific Information Report Organization And Administration Of Soviet Science (17)	12/24/1963	32	Approved For Release	3/29/2004
AD0347731	78-03117A	222	1	6	5419	Scientific Information Report Organization And Administration Of Soviet Science (19)	2/27/1964	53	Approved For Release	3/29/2004
AD0332259	78-03117A	182	1	34	3907	Scientific Information Report Physics And Mathematics (21)	10/8/1962	58	Approved For Release	3/29/2004
AD0332752	78-03117A	184	1	24	3975	Scientific Information Report Physics And Mathematics (22)	11/1/1962	57	Approved For Release	3/29/2004
AD0333426	78-03117A	187	1	31	4090	Scientific Information Report Physics And Mathematics (23)	12/6/1962	38	Approved For Release	3/29/2004
AD0333956	78-03117A	189	1	33	4171	Scientific Information Report Physics And Mathematics (24)	1/8/1963	38	Approved For Release	3/29/2004
AD0334380	78-03117A	192	1	4	4260	Scientific Information Report Physics And Mathematics (25)	1/31/1963	53	Approved For Release	3/29/2004
AD0335121	78-03117A	195	1	3	4384	Scientific Information Report Physics And Mathematics (26)	3/14/1963	71	Approved For Release	3/29/2004