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SCIENTIFIC INFORMATION REPORT

Physics and Mathematics

(22)

Summary No. 3975

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SCIENTIFIC INFORMATION REPORT

Physics and Mathematics (22)

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 six 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, and the sixth series, Organization and Administration of Soviet Science, is issued every 6 weeks. Individual items are unclassified unless otherwise indicated.

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C-O-N-F-I-D-E-N-T-I-A-L

I. PHYSICS

Atomic and Nuclear Physics

1. Discussion of 7-Bev Proton Synchrotron in Dubna

"7-Bev Proton Synchrotron," by V. V. Vladimirovskiy et al;
Moscow, Pribory i Tekhnika Eksperimenta, No 4, Jul/Aug 62,
pp 5-9

This is the introduction to a series of articles accounting for the entire issue of the source on the 7-Bev proton synchrotron in Dubna. Discussed are the selection of main parameters and the design of the accelerator. A short description is given of the grouping of structures of the accelerator, and a table of main parameters is shown.

Other articles in this source deal with the design and main parameters of the electromagnet, the electronic system, the power supply system, the electrostatic accelerator used for injection, etc.

2. Determining Nature of Fast Charged Particles

"Determination of the Nature of Charged Particles by δ -Electrons," by I. Ya. Chasnikov, Candidate of Physico-Mathematical Sciences; Alma-Ata, Vestnik Akademii Nauk Kazakhskoy SSR, No 8 (209), Aug 62, pp 96-98

The identification of fast charged particles in a nuclear photo-emulsion is usually made by measuring the multiple scattering ($p\beta c$) and the density of the clusters (ionization) in their tracks. To do this, various curves of the dependence of ionization on ($p\beta c$) are used. Checking these curves for NIKFI-R emulsion with particles of a given nature and energy shows better agreement of the experimental data with the curve of Barkas and Joung than with that of Edwards and others. However, the true curve for the NIKFI-R emulsion, apparently, is located between them.

In the region of $1.5 \text{ Bev} \geq p\beta c \geq 2.5 \text{ Bev}$, identification of particles is impossible since the same values of $p\beta c$ for protons and π -mesons correspond to the same ionization.

In this article, the possibility is examined of determining the nature of fast charged particles in nonidentified ionization regions by measuring the angles and energies of fast δ electrons and also by calculating all the δ electrons.

3. Resolvent of Schroedinger Operator for Three-Particle System

"Structure of the Resolvent of the Schroedinger Operator for a System of Three Particles and the Problem of Scattering," by L. D. Fadeyev, Leningrad Branch, Mathematics Institute imeni V. A. Steklov, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 2, 1962, pp 301-304

In this article, a representation is obtained for the resolvent of the energy operator of a system of three particles in nonrelativistic quantum mechanics, with which the continuous spectrum of this operator is studied, a theorem of expansion according to its own functions is proven, and the asymptotics for large $|t|$ solutions of the corresponding nonstationary Schroedinger equation are investigated. The method used is that developed by V. A. Steklov.

4. Improving Sensitivity of Photographic Emulsions

"Possibility of Changing the Sensitivity of the Emulsion During Irradiation," by D. M. Samoylovich, Ye. S. Barinova, and I. V. Aradashev; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 3, 1962. pp 557-559

The ability of photographic emulsions to accumulate continuously traces of charged particles from the initial time of existence of the photographic layer is considered to be an advantage of an emulsion. However, in a number of physical experiments, this property is the main deficiency in the photographic method of investigation. Very often the trace background of the particles is commensurable with the effect of the experiment and does not make possible correct interpretation of the result. In cases in which the experiment extends over a long period of time, it is not possible to attribute the phenomenon observed to some specific period of time.

The creation of controlled processes for the recording of particles in photographic emulsions with an external signal should change the photographic method and substantially increase its importance. This work deals with one of the possible methods of controlling the sensitivity of the emulsion -- irradiation in the presence of free hydrogen ions.

5. Relation Between Operators in Heisenberg's Representation and Interaction Representation

"The Question of the Relation Between Operators in Heisenberg's Representation and Interaction Representation" (presented by Academician N. N. Bogolyubov, 7 March 1962), by A. D. Sukhanov, Mathematical Institute imeni V. A. Steklov, USSR Academy of Sciences; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 3, 21 Jul 62, pp 545-548

In the Hamiltonian formalism, the following relation exists between the operators in Heisenberg's representation and interaction representations:

$$F(x) = S^+(\sigma, -\infty) F_{in}(x) S(\sigma, -\infty) = S(\infty, \sigma) F_{out}(x) S^+(\infty, \sigma),$$
where $F_{out}(x)$ [or $F_{in}(x)$] is an operator in interaction representation and $S(\infty, \sigma)$ [or $S(\sigma, -\infty)$] is a Dyson matrix (Phys. Rev, 75, 486, 1949), becoming an S-matrix for $\sigma \rightarrow -\infty$ (or ∞).

The author first considers the case of a neutral scalar self-consistent field and then turns his attention to the relation between the Hamiltonians of interaction in two representations, of the form given above.

Finally, it is established that if the S-matrix in the whole train of pulses is given as single-valued, then $S(\infty, \sigma)$ -- independent of any possible arbitrariness in the higher-order coefficient functions -- can be made quite arbitrary if it is possible to determine in different ways the rule of multiplication of $S(\infty, \sigma)$ for the operators in the representation of interaction.

6. Sensitivity and Development Centers in Nuclear Emulsions

"Structure and Size of Sensitivity Centers and Development Centers of Highly Sensitive Type P Nuclear Emulsions," by D. M. Samoylovich, V. I. Kalashnikova, and Ye. S. Barinova; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 4, Aug 62, pp 778-780

An attempt to investigate experimentally the size and structure of sensitivity centers and development centers in type P nuclear emulsions is presented. Emulsion layers 400 μ thick without a substrate and produced by the technical plastics factory were used. The investigation was carried out by the method of controlled dissolution of atomic Ag traps.

7. Excitation of C^{12} Nucleus

"Excitation of C^{12} Nucleus by 660 Mev Protons," by L. S. Azhgirey et al., Joint Institute for Nuclear Research; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 6, Aug 62, pp 1249-1252

The problem of weak inelastic scattering of high-energy protons by complex nuclei is of interest both from the viewpoint of explaining the mechanism of the transfer of some part of the energy of the fast proton to the nucleus and in connection with the investigation of polarization effects in the diffraction scattering of protons by nuclei when the weak inelastic scattering is in the nature of an accompanying process making the interpretation of data on polarization difficult.

The results of an experiment in which the weak inelastic scattering of 660 Mev protons on C^{12} nuclei was observed are given in this article. The experiment was made in connection with a study in a small angular region where interference is observed between the Coulomb and the nuclear scattering and in connection with the polarization effects in the scattering of 660 Mev protons on carbon nuclei.

8. Autoresonant Motion of Particles

"Autoresonant Motion of Particles in a Plane Electromagnetic Wave," by A. A. Kolomenskiy and A. N. Lebedev, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Doklady Akademii Nauk SSSR, Vol 145, No 6, Aug 62, pp 1259-1261

The properties of the motion of a charged particle in the field of a plane electromagnetic wave are well known. In the coordinate system where, on the average, the particle is at rest, it makes a trajectory in the form of figure eight (for a plane polarized wave) or of a circle (in the case of curved polarization). In this connection, the energy of the particle on the average remains constant, that is, resonant interaction with the wave does not take place and the motion, generally speaking, differs little from free motion.

This article draws attention to the fact that under given conditions, for example in a magnetic field, the character of the motion of a particle in the field of a plane wave may change radically.

9. Proton Polarization During Scattering on C¹²

"Polarization of 3-Mev Protons During Elastic Scattering on C¹² Nuclei," by Yu. A. Nemilov and L. A. Pobedonostsev; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 382-384

The angular dependence of polarization is studied during the elastic scattering of protons on C¹² nuclei. The results of the experiment are compared to theoretical calculations. It is shown that because of the large sensitivity of the polarization to the phase shift the latter can serve at the exact criterion to carry out the phase analysis.

10. Polarization of 3.5-Mev Neutrons During Scattering

"Polarization of 3.5-Mev Neutrons During Scattering," by P. S. Otstavnov and V. I. Popov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8) Aug 62, pp 385-397

For a number of elements, mainly with a mass number $A < 65$, measurements are made on the polarization of neutrons produced in the reaction $d+d$ during their scattering at an angle $\theta_{lab} = 30^\circ$. The dependence of the polarization on A is a continuous function.

11. Angular Distribution of Protons From Reactions With Alpha Particles

"Angular Distribution of Protons From the (α , p)-Reactions with 13-15 Mev α -Particles," by M. P. Konstantinova et al., Physico-technical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 388-393

The experimental curves for the angular distribution are given for: (1) protons of the P_0 group from the Li^6 (α , p) Be^9 and Li^7 (α , p) reactions with 13.6 and 14.7 Mev α -particles; (2) protons of the p_1 and p_2 groups from the F^{19} (α , p) Ne^{22} reaction with 14.7 Mev α -particles; and (3) protons of the p_1 group from the Al^{27} (α , p) Si^{30} reaction with 14.7 Mev α -particles. A characteristic feature of the distributions indicated is the asymmetry relative to the angle 90° (in the center of mass system) and the considerable increase of the reaction cross section for large proton emission angles ($\theta > 120^\circ$). In the F^{19} (α , p) Ne^{22} and Al^{27} (α , p) Si^{30} reactions with 13-15 Mev α -particles, the final nuclei occur mainly in the excited state: the intensity of the proton p_0 group is much smaller than the intensity of the p_1 and p_2 groups. The nature of the angular distribution of the p_2 proton group from the F^{19} (α , p) Ne^{22} reaction does not contradict the assumption that the second excited level in Ne^{22} has the characteristic 2^+ .

12. Ionization Fluctuations in Argon by Alpha Particles

"Decrease of Ionization Fluctuations Produced by α -Particles in Argon," by A. A. Vorob'yev, A. P. Komar, and V. A. Korolev, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 426-428

It is shown that the addition of 0.8% acetylene to argon significantly lowers the fluctuations of the pulse amplitude in an ionization chamber with electron collection.

13. Investigation of Millisecond Isomers

"Investigation of Millisecond Isomers Detected in Nuclear Reactions With Fast Protons," by A. M. Morozov and V. V. Remyayev, Institute of Chemical Physics, Academy of Sciences USSR, Physicotechnical Institute, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 438-447

Results are given of the investigation of short period isomeric activities previously detected by irradiating the Ti, Sr, Y. Zr. Ta, Hg (two activities), Pb, and Bi nuclei by a pulsed beam of fast protons ($E_p = 19.2$ Mev). An analysis of the experimental data revealed the following reactions yielding millisecond isomers: $Ti^{46} (p, n) v^{46m}$, $Sr^{88} (p, n) {}^{88m}Sr$, and $Y^{89} (p, pn) Y^{88m}$. The identification of the following reactions is also confirmed: $Zr^{90} (p, n) Nb^{90m1}$, $Pb^{208} (p, n) Bi^{208m}$, and $Bi^{209} (p, pn) Bi^{209} (p, pn) Bi^{208m}$, as well as $Ge^{72} (p, pn) Ge^{71m}$. More accurate values of the decay period and radiation energies have been obtained in all cases investigated. The dependence of the cross section for the production of isomers Y^{88m} (from strontium) and Nb^{90m} on proton energy is also measured. The production cross section for isomers v^{46m} and w^{180m} is measured by 19.2 Mev protons. An analysis of available data reveals that the experimental values of the cross section for production of Nb^{90} nuclei in the isomeric and ground states in the reaction $Zr^{90} (p, n) Nb^{90}$ (proton energy up to 12 Mev) are consistent with the assumption of the formation of a compound nucleus.

14. Angular Distribution of Shower Particles

"Shape of the Angular Distribution of Shower Particles," by I. V. Rechitskiy and V. M. Chudakov, Physicotechnical Institute, Academy of Sciences Uzbek SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 454-458

A new quantitative criterion is proposed for the investigation of the angular distribution of secondary particles produced in a photoemulsion by high energy nucleons. By applying the criterion, it is shown that for primary nucleon energies of $\sim 10^{11}$ ev, the distribution according to the magnitudes $x = \lg \tg \theta$ is not normal and is in qualitative accordance with the predictions of the two-center model.

15. Corrections to Rotational Spectrum of Atomic Nuclei

"Nonadiabatic Corrections to the Rotational Spectrum of Atomic Nuclei," by Yu. T. Grin' and I. M. Pavlichenkov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 465-472

The coefficient B in the expansion of the nuclear rotational energy in angular momentum is calculated. The problem is solved in the quasiclassical approximation for particles in an oscillator potential, taking into account pair correlation. The theoretical values of the coefficient B are compared to experimental ones.

16. Excitation of Atoms by Heavy Particles

"Excitation of Atoms by Heavy Particles," by L. Vaynshteyn, L. Presnyakov, and I. Sobel'man, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 518-524

The transition probabilities and effective cross sections for inelastic collisions of atoms with heavy particles are computed in a quasiclassical approximation for arbitrary values of the transition energy ΔE and perturbation matrix elements. The calculations were made without using the successive approximation method.

17. Determination of Parity and Coupling Constant

"Determination of the Parity and the Constant of the Σ -Hyperon K-Meson Coupling," by Ya. I. Granovskiy and V. N. Starikov, Institute of Nuclear Physics, Academy of Sciences Kazakh SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 525-529

With the help of experimental data on k-meson scattering on neutrons and the dispersion relations for the forward scattering, it is shown that the Σ -hyperon parity relative to the K_p system is negative and $g^2_{\Sigma}/4\pi = 10 \pm 4$.

18. Neutron-Proton Interaction Energy in Odd-Odd Nuclei

"Neutron-Proton Interaction Energy in Odd-Odd Nuclei," by P. E. Nemirovskiy; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 530-535

The neutron-proton interaction energy in odd-odd nuclei Δ_{np} is computed from the data on nuclear binding energy. The relation between this energy and the (shell) state of the proton and the electron is considered. The energy of the center of gravity of a ground multiplet of light nuclei is calculated, and it is shown that in a number of cases this energy is the same as Δ_{np} .

19. Existence of Scalar Neutral Meson Discussed

"Some Considerations in Favor of the Existence of a Scalar Neutral Meson," by V. I. Kushtan, Uzhgorod State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 581-583

Experimental data on π^- p-scattering are treated by the method of extrapolation to the nonphysical pole, the presence of which is connected with the existence of a scalar neutral meson. The results of the processing of the data apparently indicate the existence of a scalar neutral meson. It is shown that the most probable value of the mass of this meson is $(380^{+10}_{-80}) m_e$.

20. Method of Equivalent Photons Used To Calculate Polarization

"Calculation of Polarization by the Equivalent Photon Method," by A. M. Badalyan; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 608-612

It is shown that the equivalent photon method can be used to calculate polarization effects. The polarization of the radiation and of the final electron is calculated for electron Bremsstrahlung in the field of a nucleus.

21. Asymptotic Behavior of Charged Particle Wave Functions

"Asymptotic Behavior of Charged Particle Wave Functions," by R. K. Peterkop, Institute of Physics, Academy of Sciences Latvian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 616-618

The distortion of the scattered wave phase is determined for the non-relativistic reaction channels with an arbitrary number of charged particles.

22. Splitting of Photon Into Two Photons

"Splitting of a Photon Into Two Photons in the Coulomb Field of a Nucleus," by A. P. Bukhvostov, V. Ya. Frenkel', and V. M. Shekhter, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 655-660

The cross section for the transformation of a photon into two photons in a coulomb field of a nucleus is determined for the case in which the incident photon energy is either small or large compared to the electron mass. In the latter case, the calculations are made by the Weizsacher-Williams method.

23. Phase Analysis of Nucleon-Nucleon Scattering

"Phase Analysis of Nucleon-Nucleon Scattering at 210 Mev," by Yu. M. Kazarinov and I. N. Silin, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 693-701

Phase shift analysis of np and pp-scattering data is carried out simultaneously. Two phase shifts sets are chosen from the solutions obtained; upon extrapolation to 300 Mev, they correspond to sets 1 and 2, identified by Strapp and others, by making a phase analysis of pp-scattering data at 310 Mev.

24. Resonance of Spin-Wave Excitation in Atomic Nuclei

"Giant Resonance of Spin-Wave Excitation in Atomic Nuclei," by V. V. Balashov and A. F. Tulinov, Institute of Nuclear Physics, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 702-705

The main properties of the collective spin-wave excitation in nuclei are examined. Concrete calculations are made for the nucleus Ca^{40} . It is pointed out that due to the high degree of smearing out of the spin-wave excitation, the width of the fast proton inelastic scattering peak should considerably exceed the width of the photoabsorption giant resonance.

25. Transitions of Negative Mesons From Hydrogen to Other Elements

"Transitions of Negative Mesons From Hydrogen to the Nuclei of Other Elements," by S. S. Gershteyn, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62. pp 706-719

It is shown that a high probability for the transition of negative mesons from hydrogen to the nuclei of other elements is connected with the presence of intersections of molecular terms corresponding to the charge exchange. The cross section of the μ meson transitions from the K orbit of hydrogen to the carbon and oxygen nuclei is calculated, and the cascade transition of the mesic atoms thus formed to the ground state is examined. It is shown that the probability of the transition of μ^- mesons to helium nuclei is very small inasmuch as the $p \mu$ He system is an exceptional case of the $pn Z$ systems due to the absence of terms corresponding to charge exchange from the hydrogen K orbit. It is shown that the probability of inelastic collisions of the second kind for hydrogen mesic atoms in highly excited states with protons is very large and leads to a rapid transition of the mesic atoms on lower energy levels. This effect may be important for explaining the small value of the π^- meson lifetime in hydrogen.

26. Properties of K-Meson Pairs

"Note on the Properties of K-Meson Pairs," by V. I. Ogiyevetskiy, E. O. Okonov, and M. I. Podgoretskiy, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 720-723

Some properties of the K-meson pair production and decay are examined. It is shown that the type of decay is determined by the parity of the orbital momentum in the $K^0 K^0$ system.

27. Temperature Field of a Reactor Cylindrical Fuel Element

"Temperature Field in the Cylindrical Fuel Element of the Reactor Cooled by a Turbulent Flow of Liquid," by V. S. Yermakov et al., Institute of Power Engineering, Academy of Sciences Belorussian SSR; Minsk, Inzhenerno-Fizicheskiy Zhurnal, Vol 5, No 9, Sep 62, pp 38-43

A numerical solution is obtained of a system of equations for the thermal conductivity of a cylindrical bar with internal heat sources and of the equation of the thermal balance of the coolant for stationary operation of the fuel element of a nuclear reactor by the method of polynomial approximation.

28. Physical Institute's Synchrotron

"The 680 Mev Synchrotron of the Physical Institute, Academy of Sciences USSR," by A. I. Gryanov et al.; Moscow, Atomnaya Energiya, Vol 13, No 3, 1962, pp 228-234

The installation and the working diagram of the synchrotron of the Physical Institute imeni P. N. Lebedev of the Academy of Sciences USSR with a maximum electron energy of 680 Mev are described. The results of investigations of the most important characteristics of the accelerator are given. There is a brief explanation of the most effective experimental methods used to start up the accelerator.

29. High-Energy Particle Generation

"Particle Generation at Very High Energies," by W. S. Barashenkov and V. M. Mal'tsev; Moscow, Atomnaya Energiya, Vol 13, No 3, Sep 62, pp 221-227

Values are obtained for the intensities of the beams of various particles, including gamma quanta, neutrinos, and μ mesons produced during the inelastic interactions of particles at energies of $1-10^3$ Bev.

These values could be useful in designing very large energy accelerators.

30. Nonstationary Temperature Field and Thermoelastic Stresses

"Calculation of the Nonstationary Temperature Field in a Reactor Channel and Thermoelastic Stresses in a Fuel Element Can," by Yu. Ye. Bagdasarov and O. D. Kazachkovskiy; Moscow, Atomnaya Energiya, Vol 13, No 3, Sep 62, pp 241-249

Approximate analytical methods are proposed to calculate the nonstationary temperature field of fuel elements and the temperature of the coolant at a given point according to the height of the reactor channel, as well as the nonstationary thermal elastic stresses in a cylindrical fuel element can. The temperature of the coolant at the input is constant; the coolant does not undergo a change in the state of aggregation. The approximate methods are illustrated by examples.

Results of the exact calculations of these examples obtained on a computer are given.

31. Rumanian Reactor Research

"New Installations of the Bucharest Nuclear Reactor" Bratislava,
Tudomány es Technika, No 17, 30 Aug 62, p 590

The nuclear reactor of the Institute of Atomic Physics in Bucharest has been provided with new instruments and installations which were produced on the basis of designs of institute workers. One subcritical installation is suitable for studying the physics of reactors. The device makes it much easier to observe the phenomena within the reactor because, although it is fueled with the same uranium as the reactor, a special type of graphite is used to retard the neutrons. Putting this device into operation makes possible the accurate determination of the properties of the substances used in nuclear physics.

Plasma Physics32. Radial Distribution of Plasma in Magnetic Field

"Radial Distribution of Positive Column Plasma in a Magnetic Field," by L. L. Artsimovich and A. V. Nedospasov; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 5, Aug 62, pp 1022-1024

The positive column of a gas discharge becomes unstable when a longitudinal magnetic field is imposed with an intensity exceeding some critical value H_c . In a strong magnetic field, when intensity $H \gg H_c$, the movement of the plasma is turbulent. A semiquantitative examination of such a turbulent column was made by B. B. Kadomtsev (ZhTF, 31, 1961, p 1273). The conclusions in this examination do not follow from strict theory and must be verified through experimentation.

In this article, $n(r)$, which is the distribution of the concentration of a plasma along the radius, is investigated. The profile of such a distribution calculated under the assumption of a constant length of agitation differs substantially from the profile of a laminar state.

33. Interaction of Charges With Electron Plasma in a Magnetic Field

"Interaction of Charges With Electron Plasma in a Magnetic Field," by A. B. Kitsenko, Physicotechnical Institute, Academy of Sciences Ukrainian SSR; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 2, 1962, pp 305-308

The radiation charge traveling through an electron plasma located in an external magnetic field has been studied by a number of authors. In this article, the energy loss of a charged particle moving along an external magnetic field H_0 is determined. It is assumed that the velocity of the particle is considerably greater than the thermal velocity of the plasma electrons. Results which were previously known are obtained in limiting cases. The coherent radiation arising from the flow through a magnetically active plasma of a spherically symmetrical group is examined also.

34. Design of a Plasma Generator Discussed

"Plasma Generator," by V. Golavachov; Moscow, Novedades de Moscu, No 9, Sep 62

(The following is a full translation. The article did not appear in the English edition of this periodical.)

C-O-N-F-I-D-E-N-T-I-A-L

The needles on the gauges began to move dizzily on the scale; flames whirled around the room....

Sharp reports, like the blows of a giant hammer, were heard, violet flashes and a noise that constantly grew louder.... Suddenly an explosion is heard through the thick walls. A jet of fire that comes out of the machine is seen through the shielded yellow [amirillo, probably typographical error for amarillo, yellow] crystal peephole. It turned from orange to yellow, then to dazzling violet. At the same time, the cascade of sound increased impetuously, becoming stronger and louder. A deafening roar invades the area. The incandescent source seems to emit whirlwinds. Then it is placed in contact with a sheet of asbestos. After a few seconds, the refractory material burns like cigarette paper....

A marvelous work of human thought, a plasma generator, is being tested....

"In engineering, this will be a revolution similar to that caused by jet engines in aeronautics," the head of the experiments said before going down to the laboratory. He was referring to one of the most important problems for modern science, the problem of converting thermal energy into electrical energy without using machines.

One solution to this problem is the creation of a plasma generator, or, as it is usually called, a hydrodynamic magnetic generator.

Such a generator will eliminate moving parts, such as turbine disks and armatures, which more than anything slow down progress. And above all, with this machine it will be possible to obtain enormous powers of millions of kilowatts. But, unfortunately, gas, unlike metal wire, does not conduct electricity, and to convert it into a conductor it must be ionized; in other words, it is necessary to obtain plasma.

To do this, the gas is heated to a high temperature, and compounds of potassium, cesium, and other alkaline metals are added. Thus low-temperature plasma in which the electric current "in born" is obtained.

The "low temperature" is around 3,000 degrees centigrade, i.e., only half the temperature of the sun's surface. Until 10 or 15 years ago, there was no refractory metal that could withstand such heat. And this problem could be taken up only because of the development of chemistry, nuclear engineering, and rockets.

Its solution offers great advantages. Plasma installations are very economical. According to computations, the efficiency is more than 50 percent. Now a stubborn struggle is waged for every half percent efficiency, and the best steam installations do not exceed 40 percent.

The new generators belong to tomorrow's engineering. The task is difficult. Even the most resistant materials can withstand these enormous temperatures for only a short time.

Soviet scientists are attacking this last barrier. Basic computations have been made for the creation of a plasma installation with a power of tens of thousands of kilowatts. Its construction will begin soon.

This installation will be the size of an eight-story building. The time will come when the generator will begin to give current. In the meantime, experiments are being conducted on a small generator, the prototype of the future giant.

35. Magnetohydrodynamics of Plasma Flow

"On the Magnetohydrodynamics of a Quasionedimensional Plasma Flow. I," by Yu. V. Sanochnik and V. S. Yepofeyev; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, Issue 7, Jul 62, pp 782-791

Examined in the magnetohydrodynamic approximation for the $Re_m \ll 1$ case is the quasionedimensional flow of plasma in crossed electric and magnetic fields. Solutions are obtained and examined for conditions of constant "drifting velocity" and isothermal flow at arbitrary laws of cross-section variation of fields and velocities of flow along the duct.

36. Gamma Radiation of Magnetic Trap Discharge

" γ -Radiation of a Discharge in a Magnetic Trap With Additional Azimuthal Magnetic Field," by Ya. F. Volkov, V. T. Tolok, and K. D. Sinel'nikov; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, Issue 7, Jul 62, pp 811-816

Studied were properties of γ -radiation which emerges as a result of the braking of fast electrons of electrodeless discharge plasma. The presence of azimuthal field more than quadruples the intensity of γ -radiation; the energy at the same time increases 300-400 percent. Derived are relationships between the intensity of γ -radiation and discharge parameters. A feasible mechanism for acceleration of electrons is discussed.

37. Electron Properties in Weakly Ionized Cesium Plasma

"Movement and Scattering Cross Section of Electrons in a Weakly Ionized Cesium Plasma," by N. D. Morgulis and Yu. P. Korchevoy; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, Issue 7, Jul 62, pp 900-903

Investigation of the movement and associated cross section of electron scattering in cesium plasma has a significant meaning in connection with a number of important problems in modern physics and the technology of plasma and particularly in the analysis of the principle of operation of magnetohydrodynamic and thermoelectronic (plasma) converters of heat energy into electric. A similar analysis was already carried out (Acta Phys. Hungarica, 11, 103, 1960) for a strongly ionized cesium plasma, where electron scattering by plasma ions and electrons plays the principal part. Analysis of these experimental data indicates (Magyar Híradástechnika, 11, 23, 1960) that they very satisfactorily correspond to the theoretical data of this phenomenon (J. of the Phys. Soc. Jap., 13, 734, 1958). However, research in the field of weakly ionized cesium plasma (J. Phys., 8, 32, 1958; Zh. T. F., 30, 125, 1960), where electron scattering by atoms of the plasma plays the principal, is still very limited and, therefore, requires further refinement. Our last attempt (Phys. Rev. 81, 248, 1951) to deal with this problem was also of a purely qualitative nature.

38. On the Kinetics of Nonisothermal Plasma

"On the Kinetics of Nonisothermal Plasma," by V. P. Silin and L. M. Gorbunov, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 6, Aug 62, pp 1265-1268

The progress made recently in the development of a basic kinetic theory for systems of charged particles has led to the acceptance of such a collision integral for plasma that, thanks to subsequent calculation of the polarization of the medium, it is possible to examine simultaneously the collisions and the interaction with the plasma waves.

In this article, the important effect of the interaction with such waves on the transfer coefficients of nonisothermal plasma is clarified.

39. Step Ionization and Recombination

"On the Theory of Step Ionization and Recombination," by L. M. Biberman, Yu. N. Toropkin, and K. N. Ul'yanov; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, Issue 7, Jul 62, pp 827-834

Recombination with radiation, as a result of which a multielectron excited atom is formed, is examined.

An expression is derived for the coefficient of recombination with radiation which takes into account all the excited states of complex atoms.

In the Bethe-Born approximation, the step ionization of atoms by electron impact is examined. It is shown that in the near equilibrium plasma, the ionization of excited atoms plays the basic role. Similarly, the triple impact (ion + 2 electrons) recombination is stepped, as a rule.

Derived are expressions for corresponding coefficients of ionization and recombination. It is shown that the results are not very sensitive to the selection of initial effective cross sections.

40. Turbulent Heating of Plasma

"Turbulent Heating of Plasma," by M. V. Babykin et al.; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 411-421

Results of investigation of anomalous absorption of large amplitude electromagnetic waves in a plasma are given. The energy absorption observed is connected with the excitation of small-scale instabilities by the electron current. It has already been shown experimentally that the large amplitude electromagnetic wave moving across a magnetic field experiences strong attenuation which cannot be explained by collision losses. Some new experiments are described which confirm the role of collective motions in the dissipation of the energy of a wave in a plasma; the electron temperature is determined; the dependence of the absorption on the angle between the magnetic field and the direction of the propagation of the wave is clarified; and the possibility of similar ion heating is discussed. Since the heating of a plasma is connected with the development of small-scale instabilities in it, the term "turbulent" heating is proposed to designate this method of heating.

41. Development of Disturbances in a Plasma

"On the Initial Stage of Development of Disturbances in a Plasma Located in an External Magnetic Field," by F. M. Nekrasov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(8), Aug 62, pp 483-489

The longitudinal and transverse oscillations in a magnetized plasma moving along a constant external magnetic field are examined on the basis of the linear kinetic theory. The oscillations are induced by weak disturbances of the plasma distribution function. The problem is reduced to an integral equation which makes it possible to consider the initial conditions. It is shown that in the initial state of development of a certain type of disturbance, the space Fourier components of the electromagnetic field may increase. The growth condition and its character are determined.

42. Magnetic Field Topology

"Some Problems in Magnetic Field Topology II," by G. V. Skorhyakov; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, Issue 7, Jul 62, pp 777-781

The stability of the magnetic field topology created by surface currents in 2 toroidal region bounded by a smooth superconducting surface is shown. Discussed are some peculiarities of plasma behavior in the magnetic field without magnetic surfaces. The topological field structure of magnetic traps, designed for prolonged retention of plasma, is examined.

43. Weak Shock Wave Structure in a Plasma

"Structure of Weak Shock Waves in a Plasma," by R. V. Doych, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 2(9) Aug 62, pp 667-676

The structure of weak shock waves in anisotropic magneto-hydrodynamics is investigated. An expression is given for the width of weak shock waves for any direction of the shock wave front with respect to the direction of the magnetic field. This general expression is analyzed in detail for the case of a completely ionized plasma. The dependence of the velocity of weak shock waves on pressure discontinuity is presented, as well as the relation between the magnetic field strength, hydrodynamic velocity, and pressure discontinuities. An expression is given for the damping factor of weak magnetic sound waves in anisotropic magneto-hydrodynamics.

Solid State Physics44. Shock Ionization in p-n Transitions

"Theory of Shock Ionization in p-n," by A. Yu. Leiderman
 Phycotechnical Institute, Academy of Sciences Uzbek
 SSR; Tashkent, Izvestiya Akademii Nauk UzSSR, Seriya
Fiziko-Matematicheskikh Nauk, No 3, 1962, pp 32-38

The theory of shock ionization in p-n transition, formulated analogously to the Townsend gas discharge theory, has been developed in a number of works (K. C. Mc Kay, Phys. Rev., 94, No 4, 1954; C. T. Sah, R. N. Noyce, and W. Shockley, Pros. IRE, 45, 1957, p 1228; and G. V. Gordeyev, FIT, Vol 1, No 6, 1959). In addition, it was tacitly considered that the shock ionization going into the space charge does not affect the processes occurring on the boundaries of the quasineutral region and of the space charge. An attempt is made in this paper to account for the mutual effects of these processes.

45. Investigation of Selenium Photoelements

"Selenium Photoelements With a Layer of Mercuric Selenide,"
 by M. Ya. Bakirov and R. B. Gasymov; Baku, Izvestiya
Akademi Nauk Azerbaydzhanskoy SSR, Seriya Fiziko-
Matematicheskikh i Tekhnicheskikh Nauk, No 3, 1962, pp
89-94

Electron-graphic investigation has revealed that in selenium photoelements a p-n transition is created if the metals of the upper electron on the surface of the selenium create selenium junctions.

Previous investigations by M. Ya. Bakirov and R. B. Gasimov and also by various other authors show that in selenium photoelements p-n transitions may also be created by adding to the selenium a thin layer of electronic semiconductor. This led to the creation of multilayer selenium photoelements which, in many respects, differ from conventional selenium photoelements.

The results of the investigation on selenium photoelements with a layer of mercuric selenide are investigated in this article.

46. Dielectric Properties and Molecular Structure of Solutions

"Dielectric Properties and Molecular Structure of Liquid Concentrated Solutions," by M. I. Shakhparonov, R. M. Kasimov, and Ya. Yu. Akhadov, Moscow State University; Kiev, Ukrains'kyi Fizychnyy Zhurnal, Vol 7, No 8, Aug 62, pp 874-882

Some of the results of the investigation on the relaxation of electrical polarization of six binary systems obtained by measuring the dielectric permeability and the loss of these systems in the centimeter and millimeter radio range are given in this article. The following solutions were studied: acetone-binzol, acetone-carbon tetrachloride, nitrobenzol-hexan, acetone-bitrobenzol, acetone-methyl alcohol, and acetone-water.

Mechanics47. Theory of Elasticity Related to Infinite Strips

"A Problem in the Theory of Elasticity for Displacement of Infinite Strips" (presented by Academician V. I. Smirnov, 20 March, 1962) by S. Ye. Birman, Leningrad Technological Institute of the Refrigeration Industry; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 5, 11 Aug 62, pp 1016-1018

The author applies the concept of "contour conjugate functions" to obtain a general solution of the problem of infinite strips of finite width. The equations of Kolosov are written in the form:

$$2 \mu(u - iv) = \frac{2k-1}{2} \overline{\Phi(z)} - \frac{1}{2} \Phi(z) + iy \Phi'(z) - a \Psi(z);$$

$$X_x + Y_y = 2R \Phi'(z); \quad Y_y - X_x - 2iX_y = 2a \psi'(z) - 2iy \Phi''(z),$$

where $z = x + iy$; $k = 2(1-\sigma)$ for planar deformation; $k = \frac{2}{1+\sigma}$ for the condition of planar tension; and σ is the Poisson coefficient.

The $\Phi(z)$ and $\Psi(z)$ which satisfy the conditions on the contour are to be found. The contour conjugate functions are expressed as two functions of a complex variable, $P(z)$ and $Q(z)$. Four cases of deformation are considered: two in which the deformation is symmetrical and two in which it is not.

48. Radiation Through Matter

"An Inverse Problem in the Theory of Radiation Through Matter" (presented by Academician M. V. Keldysh, 29 March 1962), by M. V. Maslennikov; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 5, 11 Aug 62, pp 1019-1021

An inverse problem in transport theory for the diffusion of radiation in a medium is considered. The dispersion index $g(x)$ is determined according to the asymptotic characteristic of the radiation density $\bar{\phi}(\mu)$ which satisfies the equation.

$$(1 + \lambda \mu) \bar{\phi}(\mu) = \int_0^1 g(\mu, \mu') \bar{\phi}(\mu') d\mu',$$

where $g(\mu, \mu') = \int_0^{2\pi} g(\mu\mu' \sqrt{1-\mu^2} \sqrt{1-\mu'^2} \cos \phi) d\phi$. The parameter $\lambda \in (0, 1)$ and the nonnegative function $\bar{\phi}(\mu)$, associated with $g(x)$, define the spacially angular distribution of the radiation density.

49. Problem of a Minimum in the Stability of Equilibrium of a Rigid Body

"The Problem of a Minimum in the Stability of Equilibrium of a Rigid Body Partially Filled With a Liquid," by G. K. Pozharitskiy; Moscow, Prikladnaya Matematika i Mekhanika, Vol 26, No 4, Jul/Aug 62, pp 593-605

A number of papers have been devoted to the problem of the motion of rigid bodies with cavities partially filled with liquids. Equations of motion have been derived based on the acceptance of the common hypotheses in the theory of waves of small amplitude and the theory of small oscillations of a rigid body. According to Poincaré, disturbance of a liquid from a state of equilibrium leads to series expansion for some system of functions with coefficients dependent on time, and the problem reduces to an infinite system of second-order equations.

The problem of the stability of equilibrium of a mechanical system subject to the action of potential forces can be solved with the aid of Lagrange's theorem on the stability of equilibrium for which the potential energy has an arbitrary minimum. Criteria for a minimum of potential energy for systems with a finite number of degrees of freedom are well known, and the result is that the second variation of potential energy is positive; however, if the system possesses an infinite number of degrees of freedom, the problem is considerably complicated.

In this paper, the author considers the problem of minimum potential energy of a system consisting of a rigid body with a frozen liquid. The potential energy of the system amounts to a nonpositive correction for

the volume of frozen liquid. This correction is expanded into a series for the varying of the coordinates of the body, with coefficients in the form of double integrals of known functions over a known region.

50 Providing High Flight Velocities to Bodies

"Delivering of High Flight Velocities to Bodies," by N. N. Popov; Moscow, Vestnik Moskovskogo Universiteta, Seriya I. Matematika, Mekhanika, No 4, Jul/Aug 62, pp 69-74

The problem of the projection of a body and the results of numerical calculations are given in this paper.

Since the mathematical problem of the problem of the projection of a body by a gas is reduced to a system of nonlinear equations in partial derivatives, the calculations of the specific movements are developed numerically by a method of characteristics.

The calculations were made at the Computing Center of the Moscow State University. The results given in this article were obtained on the Strela according to the programs of N. I. Yegorev.

51. Deformed State of Irradiated Body

"On the Deformed State of Irradiated Body," by A. G. Zhugavlev; Moscow, Vestnik Moskovskogo Universiteta, Seriya I, Matematika, Mekhanika, No 4, Jul/Aug 62, pp 58-62

The radiation defect is considered as a pressure center plus a double force without moment. The state of strain which is produced by statistically distributed double forces without moment is investigated.

52. Perturbation Theory and Stability of Planetary Systems

"The Classical Perturbation Theory and the Problem of the Stability of Planetary Systems" (presented by Academician I. G. Petrovskiy 1 March 1962), by V. I. Arnol'd, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 3, 21 Jul 62, pp 487-490

The perturbation theory enables one to predict with great accuracy the movement of the planets many years in advance; however, qualitative problems on the behavior of a system over an indefinitely long period of time--for example, the question of stability--cannot be solved by this theory.

The author considers the problem of three bodies of mass M , m_1 , and m_2 , such that $m_1, m_2 \ll M$. For purposes of simplification, all are assumed to lie in the same plane.

53. Flow of Conducting Liquid in Homopolar Channel

"The Laminar Flow of Conducting Liquid in a Homopolar Channel," by V. S. Yargin; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, Issue 7, Jul 62, pp 883-890

This work is devoted to solution of the problem of isothermal flow of an incompressible conducting liquid in a homopolar channel of finite length. The case of low Hartmann numbers is considered. By an expansion in powers of M^{-1} , equations of first approximation are obtained. Solution of these equations is given. The velocity field is analyzed. The coefficient of hydraulic resistance is introduced, and the influence of end covers on the magnitude of this coefficient is examined.

54. Scattering Power of Molecules in Liquid State

"Investigation of the Scattering Power of Molecules in the Liquid State During Raman Scattering of Light," by I. L. Babich, I. I. Kondilenko, and V. L. Strizhevskiy; Kiev, Ukrains'kyy Fizychnyy Zhurnal, Vol 7, No 7, 1962, pp 742-748

The concentration dependence of the scattering power of molecules is studied experimentally during Raman scattering of light K in binary solutions. In addition, both the lines which are resonant according to Fermi and nonresonant lines are investigated. The significant dependence of value K on the concentration of the scattering substance is discussed. The experimental data obtained are also considered theoretically.

55. Scattering of Light in Solutions

"Scattering of Light in Solutions and Its Relation to Diffusion and Ultrasonic Absorption," by L. I. Lisnayskiy and M. F. Vuks, Leningrad State University; Kiev, Ukrains'kyy Fizychnyy Zhurnal, Vol 7, No 7, 1962, pp 778-781

The Rayleigh scattering and the stability of a solution have been correlated.

The existence of a relation between light scattering, diffusion, and ultrasonic wave absorption is found.

56. Rayleigh Wave Propagation Over Heterogeneous Surface

"Propagation of Rayleigh Waves Over the Surface of a Heterogeneous Elastic Body of Arbitrary Shape," by V. M. Babich and N. Ya. Rusakova; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 4, Jul/Aug 62, pp 652-665

Solutions of dynamic equations of the theory of elasticity, having a discontinuity only at the boundary, are constructed in this work. (The boundary is assumed to be free from stresses.) These solutions generalize, in the case of a heterogeneous elastic body of arbitrary shape, certain "plane" waves of Rayleigh (Differentsial'nyye i Integral'nyye Uravneniya Matematicheskoy Fiziki [Differential and Integral Equations of Mathematical Physics], by F. Frank and R. Mizes; M., Gostekhizdat, 1937).

57. Laminar Boundary Layer in an Incompressible Liquid

"Calculation of Laminar Boundary Layer in an Incompressible Liquid With Ejection or Injection," by Liu Shen-ch'uan; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 4, Jul/Aug 62, pp 666-683

This work is divided into two parts. Part I is devoted to calculation of the laminar boundary layer, in an incompressible liquid which is subject to ejection or injection by means of 2 generalized method of integral relations. Part II deals with application of the difference method to solution of the same problem only in absence of both ejection and injection. This method may be adopted for the case of ejection or injection. The results obtained by the generalized method of integral relations coincide very well with the results of the difference method. Such a comparison is given at the end of this work.

58. Flow of Viscous-Plastic Liquid Around a Blunt Body

"Formation of a Frontal Dead Zone by the Flow of Viscous-Plastic Liquid Around a Blunt Body," by I. G. Bulina and V. G. Savin (presented by Academician L. I. Sedov); Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 1, Jul/Aug 62, pp 56-58.

Recently, the problems in streamline flow of viscous-plastic liquids around bodies have attracted special attention of researchers. In the book (Voprosy Gidrodinamiki Vyazko-Plastichnykh i Vyazkikh Zhidkostey v Neftedobyche [Problems in Hydrodynamics of Viscous-Plastic and Viscous Liquids in Crude Oil Extraction]) by A. Kh. Mirzadzhanzade, Baku, 1959, a detailed analysis is given of the contemporary state of theoretical and experimental research in this field.

In the hydraulics laboratory of Moscow University, the authors conducted experimental research on the flow of viscous-plastic liquid around blunt bodies. Discovered as a result of the research was the existence of a property, under specific conditions of a frontal dead zone, which fundamentally distinguishes the flow, around bodies, of viscous-plastic liquids from the flow of ordinary liquids.

59. Influence of Friction on Loading of a Rod

"The Influence of Friction on Critical Loading of a Compressed Rod," by M. Ya. Leonov and L. M. Zoriy; Moscow, Doklady Akademii SSR, Vol 145, No 2, Jul 62, pp 295-297

As is known (Sbornik. Kolebaniya v Turbomashinakh [Collection. Oscillations in Turbines], 1955), elastic systems may lose equilibrium stability due to rise of auto-oscillations. Investigation of such cases by the small oscillation method and disregarding the friction leads to a certain value of the load parameter P^* , which divides the interval of change in the load into an instability range and a questionable range. Considering the small friction which is linearly dependent on velocity, it is possible to show that not all of the questionable range is the stability range and that the limit of the latter sometimes depends essentially on the ratio of the coefficients of friction. In connection with the indeterminacy of these coefficients, a problem arises in determination of a maximum value of load P^* , such that for the values P in $[0, P^*]$ the equilibrium of the system is always stable.

A solution of the stated problem is given in this article with the simplest example of a cantilever rod.

60. Stability of Artificial Horizon

"Stability of Artificial Horizon in the Presence of Dissipative Forces," by V. N. Koshlyakov; Moscow, Prikladnaya Matematika i Mekhanika, Vol 26, Issue 3, May/June 62, pp 412-417

Investigated in this work is the asymptotic stability of nonperturbed artificial horizon motion by taking into account small dissipative forces.

The case of a stationary base with respect to the earth and of motions with constant velocity and gyrations are examined.

61. Stability of Magnetohydrodynamic Configurations

"Conditions of Stability of Equilibrium Magnetohydrodynamic Configurations," by K. N. Stepanov and V. V. Khomenyuk; Moscow, Prikladnaya Matematika i Mekhanika, Vol 26, Issue 3, May/June 62, pp 466-470

It was shown (PMM, Vol 25, Issue 4, 1961) on the basis of the straight Lyapunov method that the equilibrium state of an ideal conducting liquid is not stable if there exist such shifts $\xi(r)$ of liquid from the equilibrium state for which the potential energy of the system ($U\{\xi\} > 0$). It is natural to expect that the state of equilibrium is stable if for all the permissible $\xi(r)$ potential energy of the system increases ($U\{\xi\} > 0$). However, an accepted determination of stability, (PMM, Vol 25, Issue 4, 1961) which does not impose restrictions on the derivatives $\partial \xi / \partial x_k$, does not permit proof of this assertion. In another determination (PMM, Vol 25, Issue 4, 1961) of stability, large disturbances $\partial \xi / \partial x_k$, are allowed, specifically, large disturbances of potential energy of the system. It should be noted that a similar situation also exists in the analysis of the stability of elastic systems (PMM, Vol 23, Issue 3, 1959).

Given in this work is the determination of the stability of the equilibrium state of an ideally conducting liquid, which differs from the determination of stability used elsewhere (PMM, Vol 25, Issue 4, 1961). Established are sufficient and necessary stability criteria, closely approximating certain criteria of the energy principle (Proc. Roy. Soc., Vol A 244, No 1236, 1958, et al.)

62. Hypersonic Flow of Rarefied Gas

"Hypersonic Flows of Rarefied Gas," by M. N. Kogan; Moscow, Prikladnaya Matematika i Mekhanika, Vol 26, Issue 3, May/June 62, pp 520-529

Examined in this work are close to free-molecular hypersonic flows, calculation of which can be performed by considering only the initial intermolecular collisions.

63. Current Distribution in Flow of Conducting Liquid

"Approximate Calculation of Current Distribution in the Flow of Conducting Liquid Along a Channel in Magnetic Field," by A. B. Vatazhin and S. A. Regirer; Moscow, Prikladnaya Matematika i Mekhanika, Vol 23, Issue 3, May/ Jun 62, pp 548-556

The author examines some problems associated with calculation of spatial distribution of electric current in a conducting medium moving in a channel in presence of a magnetic field. The necessity of posing the spatial problems arose because of the impossibility of studying such phenomenon in the framework of one-dimensional theory, as for example, the entry of conducting medium into the magnetic field and the influence of heterogeneity of boundary conditions along the perimeter of the cross section and along the channel. Spatial problems must be considered also in the study of the influence of the Hall effect.

To obtain exact solutions of spatial problems on the basis of a complete magnetohydrodynamic system of equations is for the time being unrealizable in practice, and for facilitation of their analysis different simplified models are created. Certain approximate solutions (Izv. AN SSSR, OTN, Mekhanika i Mashinostroyeniye, 1962, No 1, pp 52-58, et al.) are constructed only for a small number of simplest problems. Under consideration her is the problem of distribution of current with the flow of a conducting medium in channels in the general statement. Assumptions leading to simplified schemes of solution are also indicated.

64. Distribution of Thermal Neutrons in a Medium With Plane Source

"Distribution of Thermal Neutrons in a Medium With a Plane Source," by L. V. Mayorov; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 4, Jul/Aug 62, pp 635-651

An accurate calculation of the asymptotic distribution of thermal neutrons far from a plane source is significant for interpretation of experiments in the determination of neutron spectra in thermal columns of reactors (W.P. Stinson, L. C. Schmid, and R. E. Heineman, Nucl. Sci. and Engr., 7, 1960), subcritical assemblies, large reflectors, etc. These experiments are often used for explanation of the effect of chemical bonds in the moderator on the forming of the spectrum of thermal neutrons. Therefore, it is necessary to represent clearly the influence of other factors on the spectrum, such as escape of neutrons across the spectrum boundaries of the neutron source, neutron multiplication factor in the medium, etc.

The distribution of neutrons in a homogeneous infinite medium was studied (H. Hurtwitz and M. S. Nelkin, Nucl. Sci. and Engr., 3, 1958; P. Michael, Nucl. Sci. and Engr., 8, 1960) The present work obtained more precise results for an infinite nonmultiplying homogeneous medium. It is shown that the neutron flux $\phi(E, z)$ in an infinite medium with a plane source is of a form.

$$\phi(E, z) = \sum_{-1} e^{-\sqrt{\lambda_1} |z|} [\varphi_1(E) + c(e^{-\delta |z|})],$$

where $\delta = \sqrt{\min\{3\sigma_{tr}(\sigma_a + \sigma_s)\}}$, E is the energy of the neutrons, and z is the spacial coordinate.

65. Unsteady Burning (Melting) Rate in Semi-Infinite Solid

"On the Problem of the Unsteady Burning (Melting) Rate of a Semi-Infinite Solid," by L. K. Gusachenko, Siberian Physicotechnical Scientific-Research Institute, Tomsk; Minsk, Inzhenero-Fizicheskiy Zhurnal, Vol 5, No 9, 1962, pp 99-101

Two integral equations are obtained for the unsteady rate of burning (melting) of a semi-infinite solid. It is shown that these equations may be solved approximately by series expansion as $s \rightarrow 0$ and $s \rightarrow \infty$.

66. Dependence of Diffusion Coefficients of a Liquid on Temperature

"Dependence of Coordination Numbers and Diffusion Coefficients of a Liquid on Temperature," by G. M. Panchenkov and V. V. Yerehenkov, Moscow State University; Kiev, Ukrains'kyy Fizychnyy Zhurnal, Vol 7, No 8, Aug 61, pp 801-806

A study is made of the dependence of the diffusion coefficient of several pairs of organic substances in the liquid state over a wide temperature range. The measurements of the diffusion coefficients are carried out by a diffractor micromethod set up in a laboratory. The data obtained are compared with the diffusion coefficient values calculated by G. M. Panchenkov's theoretical formula derived with the aid of molecular kinetic conceptions.

67. Criterion for Thermal Regime

"Criterion for the Regularity of Thermal Regime Under Various Conditions for the Heating of Bodies," by A. I. Chaplina, Power Engineering Institute, Academy of Sciences Belorussian SSR; Minsk, Inzhenerno-Fizicheskiy Zhurnal, Vol 5, No 9, Sep 62, pp 118-125

The fundamental relation of the regular thermal regime is considered for heating of bodies in the case of different laws of ambient temperature variation, as well as in the case of internal heat sources. Expressions for the rate of heating are derived for each case. Its value is a function of one and the same quantities, that is, thermal diffusion of a solid, its characteristic size and the Biot or Predvoditelev number. The expression is given for the criterion of the regular thermal regime of a body.

The application of the regular thermal regime theory in the investigation of the process of drying moist materials is also given. The formula for the heat transfer coefficient in the drying process is derived by the regular thermal regime method.

68. Propagation of Nonequilibrium Heat Wave

"Propagation of a Nonequilibrium Heat Wave by Taking Into Account the Finiteness of the Velocity of Light," by A. S. Kompanyets and Ye. Ya. Lantsburg; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, Issue 1(7), Jul 62, pp 234-240

Quasistationary propagation of heat in the form of radiation through an opaque cold gas is investigated. The gas within the heated region is not initially in equilibrium with the radiation and is transparent for it. Of decisive importance is the thin intermediate layer between the transparent hot gas and the totally opaque cold gas. The balance between radiation and absorption in this layer can be described in the diffusion approximation by taking into account the finiteness of the velocity of light c . The velocity of movement of the hot region boundary v is determined for the case when the nonequilibrium radiation energy density U_1 in the transparent region is much greater than the radiation energy density at its boundary. It is demonstrated that, irrespective of the value of U_1 , the propagation velocity v is always smaller than $c/\sqrt{3}$.

69. Heat Transfer in Vapor Generating Channels

"On the Crisis of Heat Transfer in Vapor Generating Channels," by M. Ye. Shitsman, Power Engineering Institute imeni G. M. Krzhizhanovskiy; Minsk, Inzhenerno-Fizicheskiy Zhurnal, Vol 5, No 9, Sep 62, pp 9-15

A simple connection between the magnitude of the critical heat flows and the length of the vapor-generating part of the channel is established on the basis of an analysis of the experimental data of a number of authors on heat transfer in vapor-generating channels.

70. Thermodynamic Properties of Real Gases

"Calculation of Thermodynamic Properties of Real Gases at High Temperatures," by A. G. Tabachnikov, Institute of Engineers of the Maritime Fleet; Minsk, Inzhenerno-Fizicheskiy Zhurnal, Vol 5, No 9, Sep 62, pp 25-32

The methodology for the extrapolation of virial coefficients according to temperatures is given. The methodology is used to derive the equation of state for nitrogen in the temperature range 0-3,000°C.

71. Determining Thermal Conductivity Coefficient

"Automatic Installation for the Continuous Determination of the Coefficient of Thermal Conductivity of Solids Under Quasistationary Thermal Conditions," by V. V. Vlasov, Institute of Chemical Machine-Building; Minsk, Inzhenerno-Fizicheskiy Zhurnal, Vol 5, No 9, Sep 62, pp 66-73

A description of an automatic installation to determine the thermal conductivity coefficient of solids under quasistationary temperature ranges for one experiment is made in this article. The main characteristics of the elements of the diagrams are given, as well as the results of the determination of the thermal conductivity coefficient for asbestos cement.

72. Heat Transfer and Hydraulic Resistance of Tubes

"Heat Transfer and Hydraulic Resistance of Tubes With Spiral Fins in a Longitudinal Flow," by I. B. Danilov and V. Yë. Keylin, Institute of Physical Problems, Academy of Sciences USSR; Minsk, Inzhnerno-Fizicheskiy Zhurnal, Vol 5, No 9, Sep 62, pp 3-8

Data are given on heat transfer and hydraulic resistance in the case of tubes in longitudinal flows with spiral fins in the number range $Re = 2 \times 10^3 \sim 3 \times 10^4$. The results obtained for one tube are compared with the published data of other authors. An increase in the coefficient of the heat transfer and of the hydraulic resistance is observed with the flow around several tubes.

73. Effect of Longitudinal Oscillations of a Wall on Heat Transfer

"Effect of Longitudinal Oscillations of a Wall on Heat Transfer," by M. G. Alishayev; Moscow, Vestnik Moskovskogo Universiteta, Seriya I, Matematika, Mekhanika, No 4, Jul/Aug 62, pp 85-87

The secondary heat flux due to dissipation in a layer of a viscous fluid confined between two walls is investigated when one of the walls oscillates harmonically in its own plane.

Optics and Spectrometry74. Radiation of a Light Scattering Layer

"Calculation of the Radiation of a Light-Scattering Layer in Nonlinear Experiments," by A. P. Ivanov, B. M. Berkovskiy, and I. L. Katsev; Minsk, Vetsi Adakemii Navuk BSSR, Seryya Fizika-Technichnykh Navuk, No 3, 1962, pp 23-26

With high density light currents, the optical properties of scattering media change drastically, which leads to quantitative conformities in the propagation of radiation. The region of negative coefficients of absorption, where under given conditions there can be self-excitation of the light scattering medium, is of a particular interest.

The propagation of radiation in a turbid plane-parallel layer when the negative coefficient of absorption depends on the intensity of the light field is examined within the framework of geometric experiments by the method of A. Schuster (Ap. Journ. 21, No 1, 1950) and of K. Schwarzcchild (Gottinger Nachr., 41, 1906).

75. Optical Properties of Discharge Column in Helium

"Optical Properties of a Positive Direct Current Discharge Column in Helium," by S. D. Vagner, T. D. Yelesova, and F. S. Yaskelyaynen, Uch. zap. Karel'sk. ped. in-t (Scientific Notes of the Karelian Pedagogical Institute), Vol 11, No 1, 1961, pp 75-81 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 7, Jul 62, item 7Zh366)

The relative intensities of ten lines of He in a pressure interval of 0.12 to 0.74 mm Hg at different values of discharge current were measured. The electrical parameters of the plasma were measured simultaneously by means of probes. Intensities were measured by a photographic method using two characteristics curves. Probe characteristics were analyzed by processing the ion segment of the characteristic and the beginning of its electron segment. In this case, a Maxwellian electron speed distribution was assumed. Electron temperature was determined from a graph of the relationship of the logarithm of the common current derivative at the probe to the voltage between the probe and the anode. In the case of a large photocurrent from the surface of the probe, the concentration of charged particles determined from the ion segment of the characteristic gave excessively high readings. However, a comparison of concentrations determined according to the ion and electron segments of the characteristics shows that a photoeffect may be disregarded. Results of measurements show that the intensity of all the lines investigated increases with an increase in discharge current. At high pressures, a saturation phenomenon was observed, which is explained by the drop in electron temperature. The agreement between computed and experimental values of relative intensity indicates that the de-excitation of excited levels is basically due to collisions between excited atoms and electrons and collisions between excited and normal atoms, leading to the formation of molecular ions.

76. Spectral Investigation of Pulse Processes

"Use of Electron Optical Light Amplifier With a Fabry-Perot Etalon and a Monochromator for Time Sweeps of the Spectrum," by G. M. Malyshev, G. T. Razdobarin, and L. V. Sokolova, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 4, Aug 62, pp 768-770

The large lumen power of an installation with a Fabry-Perot interferometer and a monochromator for preliminary dispersion is the reason for their use in the spectral investigation of pulse processes. However, existing methods, which are based on the scanning of the spectrum with fast mechanical displacement of one of the plates of the etalon, do not make it possible to obtain the shapes of the spectral lines during a period of time considerably less than 5×10^{-5} sec.

The method proposed, using both the electron-optical amplifier and the Fabry-Perot interferometer with a monochromator for preliminary dispersion, makes it possible, on the one hand, to obtain shapes during a considerably shorter period of time (the time resolution attained with the electron-optical amplifier is 3×10^{-12} sec) and, on the other hand, to use a strong luminosity circuit. Furthermore, it is shown that the lumen power of such an instrument is approximately greater than that of the usual installation with an interferometer, monochromator, and FEU (Fabry-Perot electron amplifier). This is also very important when investigating low-intensity pulse processes.

77. Design of Magnetic Spectrometers

"Design of Magnetic Spectrometers," by Kh. Kekk; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, Issue 7, Jul 62, pp 859-866

The author develops a matrix method of designing spectrometers for charged particles. By use of three column matrices, it is possible to take into account the influence of small scatter pulses. The method allows the calculation of the distance of the image, magnification, and dispersion and resolution of spectrometers, consisting of several magnets, without calculation of the operation of each element of the optical system separately. From the obtained equations, it is possible to derive certain relationships for the intermediate images, as well as all other properties of the individual magnets.

Using the method set forth in this work, it is also possible to obtain properties of spectrometers with an electric field.

78. Relaxation Processes in Powder Electroluminescence

"Some Properties of Relaxation Processes in Powder Electroluminescence During Pulse Excitation," by I. S. Andreyev and L. M. Shapiro, Tashkent State University imeni V. I. Lenin; Tashkent, Izvestiya Akademii Nauk Uzbek SSR, Seriya Fiziko-Matematicheskikh Nauk, No 3, 1962, pp 65-69

To investigate relaxation processes in electroluminescent capacitors, it is necessary to have a special apparatus which makes it possible, first of all, to supply the capacitor with a voltage which changes with time according to a given law; secondly, to guarantee the rate of rise of this voltage with II pulse voltage of larger or at least on the same order as the rate of development of the polarization processes; and, thirdly, to analyze the law for the increase and damping of luminescence.

A II generator (two position vacuum tube relay) fed by a 3G-10 audio generator was constructed. The pulse repetition rate may change smoothly from 100 to 8,000 cps, and the amplitude, from 0 to 700 volts. The porosity of the pulses was not controlled. The pulses had negative polarity. The steepnesses of the leading and trailing edges are roughly equal and are characterized by the natural time τ (the time of rise of the voltage to 60% of the pulsed value) ~ 4 microseconds. With an increase in the repetition rate, this time decreases somewhat for the leading edge and remains unchanged for the trailing edge.

Electricity79. Investigation of Silicon Photoelements

"Research on Silicon Photoelements With Large Streams of Solar Energy," by P. I. Knigin and L. A. Dubrovskiy, Physicotechnical Institute, Academy of Sciences Uzbek SSR; Tashkent, Izvestiya Akademii Nauk UzSSR, Seriya Fiziko-Matematicheskikh Nauk, No 3, 1962, pp 39-44

In recent years, the development of silicon photoelements with an efficiency reaching 11% makes it possible to look into the creation of powerful instruments for the conversion of solar energy into electrical energy. One of the ways of solving this problem is to use solar energy concentrators which would make it possible to supply large streams of light to the photoconvertor and by the same token to expect a larger electrical output per unit area of the photoconvertor. This would probably lead to the development of comparatively compact and economical instruments.

For an accurate, quantitative analysis of the role of the various factors affecting the work of the photoelement during large light streams, it is first necessary to investigate the main characteristics of the photoelement.

This article explains the dependence of the photocurrent I_{eff} (the effective current from the electrons and the holes created by the light and unable to recombine before separation at the barrier), the short-circuit current I_{kz} ($R_{\text{H}}=0$), and the photo efficiency on the intensity of the incident light stream Φ .

80. Thin Wire Heating by Alternating Current

"Heating of Thin Wire by Alternating Current," by M. A. Gol'dshtik, Central Boiler and Turbine Institute imeni I. I. Polzunova; Minsk, Inzhenerno-Fizicheskiy Zhurnal, Vol 5, No 9, Sep 62, pp 90-93

It is experimentally shown that a thin metal filament located in an air flow will have a higher temperature when heated by an alternating current than when heated by a direct current of the same strength. The value of the difference and its dependence on the rate of flow are shown to be very different from theoretical expectations.

II. MATHEMATICS

81. Boundary Value Problems for Parabolic Equations With Discontinuous Coefficients

"Boundary Value Problems for Parabolic Equations With Discontinuous Coefficients" (presented by Academician I. G. Petrovskiy, 28 March 1962), by G. K. Namazov, Institute of Mathematics and Mechanics, Academy of Sciences Azerbaydzhan SSR; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 6, 21 Aug 62, pp 1228-1231

O. A. Oleynik (DAN, 124, No 6, 1959; and Izv. AN SSSR, Ser. Matem., 25, No 1, 1961) obtained a solution of boundary value problems for second-order elliptical and parabolic equations with discontinuous coefficients as the limit of solutions of corresponding boundary value problems for equations with smooth coefficients.

In this paper, the author obtains a solution of several boundary value problems for second-order parabolic equations with discontinuous coefficients which is based on methods developed by Oleynik in the aforementioned works.

82. Uniqueness of Extreme Functions of Complex Variables

"Uniqueness of Extremal Functions in Evaluations of Taylor Coefficients for Bounded Functions of Two Complex Variables" (presented by Academician M. A. Lavrent'yev, 29 March 1962), by I. I. Davrin, Moscow Regional Pedagogical Institute imeni N. K. Krupska; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 6, 21 Aug 62, pp 1195-1198

The author discusses the uniqueness of extremal functions in the evaluation of Taylor coefficients for bounded functions. Several theorems are proven relating to the function $F(w, z) = \sum_{m_1 n=0}^{\infty} a_{m_1 n} w^{m_1} z^n$, satisfying con-

ditions: (a) It is regular in the bicylinder $E \{ |w| < R_1, |z| < R_2 \}$; and (b) For nearly every fixed t_0 in the segment $[0, 2\pi]$ for $0 < \rho < 1$ there is a bounded integral $\int_0^{2\pi} |\psi(\rho e^{i\varphi}, t_0)| d\varphi$ where $\psi(\rho e^{i\varphi}, t) \equiv F(R_1 \rho e^{i\varphi}, R_2 \rho e^{i(\varphi-t)})$.

$$\int_0^{2\pi} |\psi(\rho e^{i\varphi}, t_0)| d\varphi \text{ where } \psi(\rho e^{i\varphi}, t) \equiv F(R_1 \rho e^{i\varphi}, R_2 \rho e^{i(\varphi-t)}).$$

83. Parabolic Equations With Discontinuous Coefficients

"The Method of Potentials for a Parabolic Equation With Discontinuous Coefficients" (presented by Academician S. L. Sobolev, 31 March 1962), by L. I. Kamynin; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 6, 21 Aug 62, pp 1213-1216

The paper concerns the solution of basic boundary value problems and also mixed problems with an infinite region of initial conditions (including the Cauchy problem) for a univariate parabolic equation with coefficients undergoing discontinuities of the first kind along a finite number of lines. It is assumed that the lines of discontinuity and also the lateral boundaries are given by equations of the form $x = X(t)$, where $X(t)$ satisfies the Hölder condition for exponents greater than $1/2$. Furthermore, the coefficients of the equation outside of the lines of discontinuity must satisfy the Hölder condition for x (for the leading coefficient as well as for t) with nonzero exponents. In regions which are unbounded for x , the initial functions and the right side can have an exponential increase with respect to x . In the paper is indicated the existence of classical solutions for such a type of problem, continuous together with the first derivative with respect to x up to the lines of discontinuity of the coefficients.

84. Equation of a Neutral Type With a Small Lag

"An Equation of a Neutral Type With a Small Lag" (presented by Academician I. G. Petrovskiy, 8 March 1962), by A. B. Vasil'yeva, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 3, 21 Jul 62, pp 495-497

The author considers a differential equation with the argument -- of a neutral type ($\Delta t = \text{const} > 0$) -- in tabular form:

$$\dot{x}(t) = f(t, x(t), x(t - \Delta t), \dot{x}(t - \Delta t))$$

for the initial condition $x = \phi(t)$, $0 \leq t \leq \Delta t$.

The behavior of the solution satisfying the initial condition for $\Delta t \rightarrow 0$ is investigated.

85. Extremal Quasi-Conformal Mappings in Space

"Extremal Quasi-Conformal Mappings in Space" (presented by Academician M. A. Lavrent'yev, 28 February 1962), by V. V. Krivov; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 3, 21 Jul 62, pp 516-518

In the theory of Q -quasi-conformal mappings of flat regions, extremal mappings (with the least possible Q) have been fully studied. In this article some three-dimensional regions, in the familiar sense of extremal mappings, are investigated. The proof is given by the method of modules in space.

86. Asymptotic Lines on Surfaces of Negative Curvature

"Properties of Asymptotic Lines on a Surface With Slowly Decreasing Negative Curvature" (presented by Academician P. S. Aleksandrov, 6 March 1962), by E. R. Rozendorn, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 3, 21 Jul 62, pp 538-540

The author investigates regular surfaces of negative Gaussian curvature K in 3-dimensional Euclidean space E_3 . As is known, asymptotic lines on a surface of constant negative curvature form a Chebyshev net: in any asymptotic rectangle the opposite sides are equal. In this article, the Chebyshev properties of asymptotic nets are generalized for surfaces with negative Gaussian curvature which is nearly constant. It is proven that in this case the sum of two adjacent sides in an asymptotic rectangle differs little from the sum of two opposite sides.

87. Difference Methods in Solution of Cauchy Problem

"Polar Difference Methods in the Solution of the Cauchy Problem for a System of Ordinary Differential Equations," by N. P. Salikhov; Moscow, Zhurnal Vychislitel'noy Matematicheskoy Fiziki, Vol 2, No 4, Jul/Aug 62, pp 515-528

The article generalizes some results in a paper by Yu. V. Rakitskiy in an earlier issue of this journal (Vol 1, No 6, 1961, pp 947-962), in which appeared a formula for the error in an approximation solution of the Cauchy problem for a system of ordinary differential equations.

88. Asymptotic Decomposition of Error in a Difference Method

"Asymptotic Decomposition of the Error in a Difference Method of Solution of the Cauchy Problem for a System of Ordinary Differential Equations," by A. N. Tikhonov and A. D. Gorbunov; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 4, Jul/Aug 62, pp 537-548

The Cauchy problem for a system of ordinary differential equations

$$dy/dx = f(x,y), y(a) = b$$

is considered, where $y(x) = y^{(1)}(x), \dots, y^{(n)}(x)$ is the required vector-function in x in N -dimensional space and $f(x,y) = f^{(1)}(x,y), \dots, f^{(n)}(x,y)$ is the given vector-function in x and $y = y^{(1)}, \dots, y^{(n)}$ in $(N-1)$ -dimensional space.

The error in the difference method of solution is considered from two standpoints: an a priori asymptotic decomposition and an a posteriori asymptotic presentation.

89. Existence of Solutions of Countable System of Partial Differential Equations

"A Theorem for the Existence of Solutions of a Countable System of Partial Differential Equations," by M. U. Tulegenov; Alma-Ata, Vestnik Akademii Nauk Kazakhskoy SSR, No 8 (209), Aug 62, pp 68-72

The paper concerns a system of partial differential equations involving real and continuous functions. The author obtains solutions of the system and indicates their continuity and differentiability, based on a method by Prof K. P. Persidskiy ("A Countable System of Equations With Partial Derivatives," PMM, Vol 14, No 1, 1950).

90. Nomographic Solutions of Second-Order Differential Equations

"Nomographic Solutions of Second-Order Differential Equations" (presented by Academician P. S. Aleksandrov, 3 March 1962), by S. V. Bakhvalov; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 4, 1 Aug 62, pp 710-712

The paper presents a nomographic method for the solution of the second-order differential equation $d^2v/du^2 = F(u, v, dv/du)$ which requires the existence of a Masso determinant satisfying certain

conditions. The method makes use of the following theorem: The necessary and sufficient conditions that the given equation be monographically representable are that its general solution is a solution of the differential equation for geodesic lines on a sphere under the conditions

$$\left\{ \begin{array}{l} 11 \\ 2 \end{array} \right\} = 0, \left\{ \begin{array}{l} 22 \\ 1 \end{array} \right\} = 0.$$

91. Averaging in Differential Equations

"Averaging in Certain Systems of Differential Equations"
(presented by Academician I. G. Petrovskiy, 12 March 1962),
by V. M. Volosov, Moscow State University imeni M. V.
Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 145,
No 4, 1 Aug 62, pp 713-715

The degenerate system of differential equations $\dot{x} = \text{constant}$; $\dot{y} = Y(x, y, t, 0) \pm Y(x, y, t)$ is given, and a number of different conditions, including the Lipschitz condition, are imposed on it. The article includes two theorems for averaging which allow the dependence of the average values on the selection of the trajectory of the system.

92. Handling of Information in Solution of Differential Equations

"Optimal Means for Handling Information in the Solution of Differential Equations," by N. S. Bakhvalov; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2,
No 4, Jul/Aug 62, pp 569-592

Assume an equation $u_t = P(t, x, u)$ is to be solved, where $P(t, x, u)$ is some operator defined on the functions $u(t, x)$ for every fixed t . Further, assume that for the selection of the means of solution of the problem, the initial data are related to some class of functions $W(0)$. Then the solution of $u(t, x)$ for $u(0, x) \in W(0)$ constitutes some class of functions $W(t)$.

The following problem is studied, for the case in which all $W(t)$ are closed compacts: how to minimize the quantity of information necessary for defining a function from $W(t)$ with an accuracy of ϵ with change in t .

93. Stability of Solutions of Linear Differential Equations

"A Study of the Stability of Solutions of a Linear Differential Equation With Periodic Coefficients and Uniform Delay of the Argument by the Method of Hill," by K. G. Valeyev; Moscow, Prikladnaya Matematika i Mekhanika, Vol 26, No 4, Jul/Aug 62,

It is shown that a method of G. W. Hill ("On the Part of the Lunar Perigee Which Is a Function of the Mean Motions of the Sun and Moon," Acta Math, 1886, VIII, pp 1-36) can be applied to the study of solutions of a linear differential equation with periodic coefficients and uniform delay of the argument. The example given is a second-order differential equation with concentrated delay. The method presented is readily generalized for a system of m n th-order equations with concentrated and continuously distributed uniform delay of the argument.

94. Determination of Uniformly Valid Solutions by Method of Perturbation of Coordinates

"Determination of Uniformly Valid Solutions of Differential Equations by the Method of Perturbation of Coordinates," by M. F. Pritulo; Moscow, Prikladnaya Matematika i Mekhanika, Vol 26, No 3, Man/Jun 62, pp 444-448

For approximating solutions of differential equations containing some parameter ϵ a method is applicable which consists of expanding a valid solution in a series of degree ϵ and calculating its first few coefficients. An analogue situation arises when the small parameter does not enter into the differential equation but only into the boundary conditions. Quite often zero-order solutions are of interest in the region of special surfaces which are not characterized by a valid solution of the equation. In higher-order solutions these singularities are not only preserved but are even more pronounced. As a result of this, series of degree ϵ in the neighborhood of such special surfaces diverge, and the method of a small parameter does not give a solution. This difficulty can be avoided if not only the desired function but also the independent variables are expanded into a series of degree ϵ .

The new (perturbed) coordinates are determined by the conditions for the uniformly valid solution of the differential equation and simultaneously defined with the solution of the problem (M. I. Lighthill, "A Technique for Rendering Approximate Solutions to Physical Problems Uniformly Valid," Philosophical Magazine, 1949, Vol 40, No 311). In addition to its other shortcomings, such a system is unwieldy.

In the paper it is shown that a uniformly valid solution can be found from a power series resulting from use of the common method of a small parameter but not from a differential equation in perturbed coordinates.

95. Most Highly Mobile Einstein Spaces of Variable Curvature

"Most Highly Mobile Einstein Spaces of Variable Curvature" (presented by Academician A. N. Kolmogorov, 21 March 1962,) by I. P. Yegorov, Penza Pedagogical Institute imeni V. G. Belinskiy; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 5, 11 Aug 62, pp 975-978

The article concerns the order r of groups of movement \mathcal{G}_r of n -dimensional Riemann Einstein spaces V_n . In the general case when the metric of the space is taken to be of variable sign, the problem of determining the order of complete groups of movement of the most highly mobile Einstein spaces of variable curvature had not been previously solved.

This article gives the solution of this problem and indicates the accuracy of the order r of the groups of movement of the spaces considered.

96. Linear Equations With Uniform Delay of Argument

"Linear Differential Equations With Exponential Coefficients and Uniform Delay of the Argument. The Usual Case," by K. G. Valeyev; Moscow, Prikladnaya Matematika i Mekhanika, Vol 26, No 3, May/June 62, pp 449-454

Equations such as those considered here -- with exponential coefficients and uniform delay of the argument -- are frequently encountered in engineering problems. The treatment of the subject is carried out by a method which is presented as a generalization of the author's findings in a previous paper ("Solution and Characteristic Indicators in the Solutions of Certain Systems of Linear Differential Equations With Periodic Coefficients," FMM, 1960, Vol 24, No 4). The problem reduces to a study of a Laplace transform (Lavrent'yev et al., "Methods in the Theory of Functions of a Complex Variable," Moscow, Fizmatgiz, 1958) for the solution of a system of differential equations. This solution is given in asymptotic form for large values of the argument.

The method presented makes it possible to construct a particular solution satisfying the given initial conditions. Construction of the solution of a system of linear differential equations in the neighborhood of a regular singular point differs from the construction by the method of Frobenius in the same way that Euler's method for the solution of linear differential equations with constant coefficients does from the solution of these equations with the aid of a Laplace transform (referred to above).

97. Estimating Error in Method of Nets

"The Problem of Estimating the Error in the Method of Nets for Polyharmonic Equations," by V. I. Lebedev; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 4, Jul/Aug 62, pp 593-602

A theory is proven for estimating the increase, as they approach the limits of a region, of the derivatives of polyharmonic functions u belonging to a class $H(p, A, \lambda)$. On the basis of this theorem, the error arising in the method of nets from the approximation of the polyharmonic operator $\Delta^m u$ by a difference operator is estimated.

98. Convergence and Accuracy of Homogeneous Difference Systems

"Convergence and Accuracy of Homogeneous Difference Systems for Univariate and Multivariate Parabolic Equations," by A. A. Samarskiy; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 4, Jul/Aug 62, pp 603-634

The article considers univariate and multivariate problems involving homogeneous systems for quasilinear parabolic equations with one or more spacial variables. In the first part, equations for heat conductivity with coefficient of heat conductivity $k = k(x, t, u)$ are studied. The basic a priori estimates for a four-point implicit system (one with angle of lead) and a six-point symmetrical implicit system are refined, making it possible to estimate the degree of accuracy of univariate systems for quasilinear parabolic equations with coefficients having shifting (slanting) discontinuities on a finite number of curves $x = \eta(t)$. In addition, the results connected with a linear equation for heat conductivity, obtained by the author in a previous issue of this journal (Vol 1, No 5, 1961, pp 806-824), are refined.

In the second part of the article, systems with angle of lead approximating multivariate equations of a parabolic type are studied. Proceeding in a manner similar to that in the case of univariate equations, the author proves univariate convergence and gives an estimate of the degree of accuracy of homogeneous systems in a class of smooth and discontinuous coefficients.

99. Propagation of Perturbations in Systems With Nonlinear Boundary Conditions

"Propagation of Perturbations in Systems With Nonlinear Boundary Conditions," by K. A. Lur'ye; Moscow, Prikladnaya Matematika i Mekhanika, Vol 26, No 3, May/Jun 62, pp 503-510

The first part of the paper is devoted to a study of general solutions of univariate problems involving oscillations with nonlinear boundary conditions. The applicability of D'Alembert's general solution is also indicated.

The second part analyzes oscillation in a system consisting of a pipeline and shutoff valve with a nonlinear spring. The problem is studied for the linear condition by A. I. Lur'ye and A. I. Chekmarev. In the course of calculating the mass of the valve and friction in the spring, the author resolves the problem into a neutral-type differential-difference equation. Only the condition of zero mass of the valve and absence of friction is considered. The character of the resulting oscillations is determined and their stability investigated.

100. Metric Automorphisms With a Quasi-Discrete Spectra

"Metric Automorphisms With a Quasi-Discrete Spectrum," by L. M. Abramov; Moscow, Izvestiya Akademii Nauk SSR Seriya Matematicheskaya, Vol 26, No 4, Jul/Aug 62, pp 513-530

The paper presents a complete metric classification of fully ergodic automorphisms with quasi-discrete spectra. The entropy of such an automorphism is calculated.

Submitted 19 January 1961.

101. Some Sets of Sequences

"Some Sets of Sequences and Functions Determined by the Behavior of Fourier Series," by A. A. Konyushkov; Moscow, Izvestiya Akademii Nauk SSR, Seriya Matematicheskaya, Vol 26 No 4, Jul/Aug 62, pp 531-548

The article is concerned with some sets of sequences in Orlich spaces L^p , connected with Fourier-Stieltjes series, and sets of functions from L_p for which series of a type appearing in theorems of Hausdorff and Young and Hardy and Littlewood converge.

Submitted 19 January 1961.

102. Methods for Summing Taylor Series

"Methods for Summing Taylor Series," by L. V. Taykov; Moscow, Izvestiya Akademii Nauk SSSR, Seriya Matematicheskaya, Vol 26, No 4, Jul/Aug 62, pp 625-630

Necessary and sufficient conditions are found for the regularity of a triangular matrix of real numbers for a class of functions, analytic within a unit circle and continuous up to its circumference.

103. Nodal Solutions of Systems of Linear Inequalities

"Algorithms for Finding Nodal Solutions of a System of Linear Inequalities" (presented by Academician A. N. Kolmogorov, 13 February 1962), by S. N. Chernikov; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 1, 1 Jul 62, pp 41-44

The article presents two algorithms:

The first (called an algorithm of sequential "perforation"), depending on the given solution of a system of linear inequalities, $T_j(x) = L_j(x) - a_{j1}x_1 + \dots + a_{jn}x_n - a_j \leq 0$ ($j = 1, 2, \dots, m$),

with rank $r < 0$, gives some kind of nodal solution, i.e., a solution which transforms the inequality into an equality with linearly independent forms $L_j(x)$.

The second (called an algorithm of sequential "shearing"), depending on the given nodal solution of a system of linear inequalities with rank equal to the number of its unknowns, gives some kind of solution (nodal) with the greatest (or least) value of the chosen coordinate.

104. Dynamic Programing for Nonlinear Systems

"Some Problems in the Theory of Dynamic Programing for Nonlinear Systems," by Ya. N. Roytenberg; Moscow, Prikladnaya Matematika i Mekhanika, Vol 26, No 3, May/June 62, pp 418-430

The article concerns problems in the theory of dynamic programing (R. Bellman, Dynamic Programing, Princeton University Press, 1957) as regards the methods selected for controlling an operation. The author studies the problem of selecting the controlling elements whose use would establish a law, defined in phase space (or subspace), governing a nonlinear system or would guarantee the transition of a nonlinear system through predicted conditions in defined intervals of time. An analogous problem for linear systems has already been considered by the author in a previous paper ("Some Problems in the Theory of Dynamic Programing," PMM, 1959, Vol 23, No 4).

105. Radicals and Decomposition of Rings

"Radicals and Decomposition of a Ring," by Academician (Academy of Sciences Moldavian SSR) V. A. Andrunakiyevich, Institute of Physics and Mathematics, Academy of Sciences Moldavian SSR; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 1, 1 Jul 62, pp 9-12

In this article it is shown that the theorem of Faith (Arch. Math., 12, 179, 1961) on the decomposition of an associative MP-ring into the direct sum of a regular radical and ring, bounded by Jacobson's radical, is a special case of a more general proposition.

Associative rings are considered. The radical of a ring is understood to be the axiomatic radical as defined by Kurosh (Matem. Sborn., 33 (75), 13, 1953). The radical of a ring is called "hereditary" if every ideal of a radical ring is itself a radical ring.

106. Automorphisms and Endomorphisms of Abelian Groups

"Automorphisms and Endomorphisms of Abelian Groups," by A. P. Mishina, chair of higher algebra; Moscow, Vestnik Moskovskogo Universiteta; Seriya I: Matematika, Mekhanika, No 4, Jul/Aug 62, pp 39-43

The group G is said to possess the property C (or C') if each automorphism (or endomorphism) of any subgroup of G can be extended to an automorphism (or endomorphism) of G itself.

A theorem is proven:

The Abelian group G possesses the property C (or C') if and only if it is one of the following forms: (1) G is a complete group, (2) G is a torsion group each incomplete primary component of which is a direct sum of cyclic groups of the same order, and (3) G is the direct sum of a complete torsion group (can be zero) and a torsion-free group of rank one.

Submitted for publication 30 February 1961.

107. Relation Between Finite Group and Its σ - and τ -Commutations

"The Relation Between the Formation of a Finite Group and Its σ - and τ -Commutations," by S. A. Rusakov and S. A. Safonov; Minsk; Izvestiya Akademii Nauk Belorusskoy SSR, Seriya Fiziko-Tekhnicheskikh Nauk, No 3, 1962, pp 9-14

The effect of σ - and τ -commutations of a group on the nature of the group itself is studied. The concept of σ - and τ -abelian groups is also considered. With $\sigma = (p)$ (p being a prime number giving the order of the group), the author arrives at the concept of a p -abelian group, studied by S. A. Chunikhin (Matem. Sb., Vol 25 (67), No 3, 1949, pp 321-346).

With these concepts defined, the author makes a study of finite groups. He establishes the necessary and sufficient conditions for σ - and τ -abelian groups and also the conditions for the existence of invariant σ -Hall subgroups (Wielandt, Math. Zeitschr., 71, 1959, pp 461-462).

108. Simultaneous Approximation of Near-Periodic Functions and Their Derivatives

"Simultaneous Approximation of Near-Periodic Functions and Their Derivatives" (presented by Academician V. I. Smirnov, 16 February 1962), by Ye. A. Bredikhina, Kuybyshev Aviation Institute; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 1, 1 Jul 62, pp 17-20

Given that $W^{(r)}$ is the class of all finite functions having bounded derivatives of order r on all real axes, and $P^{(r)}$ and $P_{2\pi}^{(r)}$ are corresponding classes of all periodic and 2π -periodic functions of $W^{(r)}$, the author presents two theorems for approximating near-periodic functions and their derivatives:

(1) For any real $\sigma > 0$ and positive integral r , as $p \rightarrow \infty$, there exists an asymptotic equality

$$C_{\sigma, r}(W_s^{(r)}) = \frac{4}{\pi^2} \ln(p+1) + O(\ln \ln \ln p), \text{ where } p = \min\{\sigma, r\}.$$

(2) When $r \rightarrow \infty$ uniformly for all $\sigma > 0$, the asymptotic equality $C_{\sigma, r}(P^{(r)}) = \frac{4}{\pi^2} \ln(r+1) + O(\ln \ln \ln r)$ is valid.

109. Probability Problem of Optimal Control

"A Probability Problem of Optimal Control," by Academician A. N. Kolmogorov, Ye. F. Mishchenko, and Academician L. S. Pontryagin, Mathematical Institute imeni V. A. Steklov, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 5, 11 Aug 62, pp 993-995

$p(\sigma, x, \tau, y)$ is the probability density of a Markov process in n -dimensional Euclidean space R_n ($n \geq 3$) satisfying Kolmogorov's equation

$$\frac{\partial p}{\partial \sigma} + \sum_{i,j=1}^n a^{ij}(\sigma, x) \frac{\partial^2 p}{\partial x^i \partial x^j} + \sum_{i=1}^n b^i(\sigma, x) \frac{\partial p}{\partial x^i} = 0.$$

A point z moves in the space R_n according to the law $z = z(t)$. Its environment, bounded by a closed surface $\Sigma_t = z(t) + \epsilon \Sigma$ and related to the stationary surface Σ by a small coefficient of correspondence ϵ (for simplification Σ is taken to be a sphere of unit radius), also moves with it.

The article defines the probability $\varphi(\sigma, x, \tau)$ that a random point whose transfer density satisfies Kolmogorov's equation will intersect the the surface Σ_t in the time interval $\sigma \leq t \leq \tau$. Kolmogorov's formula and its proof by Ye. F. Mishchenko and L. S. Pontryagin, based on a previous paper by them (Izv. AN SSSR, Ser, Matem., 25, 1961, p 477), are also presented.

110. Diffraction on Convex Bodies

"Short-Wave Asymptotes in the Problem of Diffraction on Convex Bodies" (presented by Academician V. I. Smirnov, 12 March 1962), by V. S. Buslayev, Leningrad State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSR, Vol 145, No 4, 1 Aug 62, pp 753-756

The article presents a strict justification for the principal terms of the short-wave asymptotes of Green's function, $G(x', x; k)$, in Dirichlet's external problem for the Helmholtz equation on a plane. Green's function satisfies the equation

$$(-\nabla_x^2 - k^2)G(x', x; k) = \delta(x - x') \quad (x, x' \in D, k > 0) \text{ and boundary}$$

conditions $G(x', x; k)|_{x \in L} = 0;$

$$\int_{\Sigma_R} dS_x \frac{\partial G(x, s; k)}{\partial |x|} - ikG(x', x; k)|_{|x|=R} \rightarrow 0, \quad |x| = R \rightarrow \infty.$$

111. Locally Convex Spaces

"A Class of Locally Convex Spaces" (presented by Academician P. S. Aleksandrov, 16 February 1962), by V. L. Levin; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 1, 1 Jul 62, pp 35-37

The article introduces a new class of locally convex spaces, including the majority of those applicable in the analysis of functional spaces. For these spaces (called \mathcal{L} -spaces in the article), the theorems of Banach on open mappings and closed graphs are generalized. The relation between spaces and absolutely complete spaces and absolutely complete spaces is also studied, and the necessary and sufficient conditions for absolute completeness and hypercompleteness of a separable Montel space and conjugate to an LF-space are determined.

112. Problem Involving Small Parameter

"A Problem involving a Small Parameter," by V. M. Alekseyev, chair of mathematical analysis; Moscow, Vestnik Moskovskogo Universiteta; Seriya I; Matematika, Mekhanika, No 4, Jul/Aug 62, pp 17-27

A system of ordinary differential equations is considered. Its solutions tend to discontinuous functions if the small parameter approaches zero. This result is applied to the problem of three bodies in celestial mechanics.

Submitted for publication 11 October 1961.

III. CONFERENCES

113. Recent Soviet Conferences in Mathematics and Physics

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

a. All-Union Colloquium on Limiting Theorems of the Theory of Probability; mid-September 1962, Fergana; sponsored by the Mathematics Institute imeni V. A. Steklov of the Academy of Sciences USSR, the Institute of Mathematics imeni V. I. Romanovskiy of the Academy of Sciences Uzbek SSR, and the Tashkent State University imeni V. I. Lenin. (Pravda Vostoka, 25 Sep 62, p 4)

b. 12th Annual Conference on Nuclear Spectroscopy; 26 January-2 February 1962, Leningrad. (Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, Vol 26, No 9, Sep 62, entire issue)

c. 11th Conference on Luminescence (Molecular Luminescence and Luminescence Analysis); 10 - ? September (several days) 1962, Minsk. (Sovetskaya Belorussiya, 11 Sep 62, p 1)

d. Theoretical Conference on Philosophical Problems of the Physics of Elementary Particles; 25-26 April 1962, Moscow; sponsored by the Physics Institute imeni P. N. Lebedev. (Vestnik Akademii Nauk SSSR, No 7, Jul 62, p 97)

e. Interdepartmental Conference on the Physics of the Upper Atmosphere; 8-10 May 1962, Moscow; US participation. (Vestnik Akademii Nauk SSSR, No 7, Jul 62, p 112)

f. First Plenum of the Commission on the Study of the Rotation of the Earth; 10-13 April 1962, Kiev; sponsored by the commission under the Astronomical Council of the Academy of Sciences USSR. (Vestnik Akademii Nauk SSSR, No 8, Aug 62, p 121)

g. Expanded Conference on the Study of Seismic Surface Waves; 10-13 April 1962, L'vov; sponsored by the Council on Seismology under the Presidium of the Academy of Sciences USSR, and the Seismology Branch of the Institute of Physics of the Earth imeni O. Yu. Shmidt of the Academy of Sciences USSR. (Vestnik Akademii Nauk SSSR, No 7, Jul 62, p 115)

114. Delegates to International Atomic Energy Agency Conference

"Departure of the Belorussian Delegation for the Sixth Session of the General Conference of the International Atomic Energy Agency," Sovetskaya Belorussiya, 15 Sep 62, p 1

The delegation of the Belorussian SSR, consisting of A. N. Sevchenko, the delegation head, A. K. Krasin, N. A. Borisevich, Ye, A. Zhikharev, V. N. Fisenko, and A. F. Krayushkin, left Minsk on 15 September 1962 for Vienna to take part in the Sixth Session of the General Conference of the International Atomic Energy Agency.

115. International Conference on High Energy Physics

"Dubna Scientists Go to Balaton"; Moscow, Leninskoye Znamya, 25 Sep 62, p 4

On 25 September 1962, the International Conference on High Energy Physics opened in Balatonfoldvar, a small town on Lake Balaton in Hungary.

The Joint Institute for Nuclear Research is taking an active part in the conference which was organized by the Hungarian Academy of Sciences. The delegation of scientists from Dubna, headed by A. A. Tyapkiny, deputy director of the Laboratory on Nuclear Problems, arrived in Hungary on 24 September 1962. The Soviet physicist M. I. Podgoretskiy, Prof Chang Wen-yu (1728/2429/5940) and Yen Wu-kuang from China, the young Vietnamese researcher Nguyen Dinh Tu, and three Hungarian physicists, Gabor Domokos, Gyorgy Pinter, and Peter Suranyi, are among the delegates.

The delegates from the Joint Institute for Nuclear Research bring to the conference reports on the latest work in experimental high energy nuclear physics conducted in the laboratories at Dubna by the scientists of the countries of the socialist camp.

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Washington, DC 20505

7 September 2004

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

Dear Ms. Schoen:

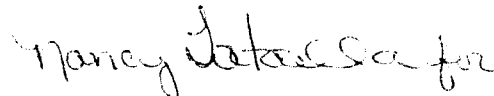
In February of this year, DTIC provided the CIA Declassification Center with a referral list of CIA documents held in the DTIC library. This referral was a follow on to the list of National Intelligence Surveys provided earlier in the year.

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

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

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

Sincerely,



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

Enclosures:

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



Processing of OGA-Held CIA Documents

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

OGA Doc ID	Job Num	Box	Fldr	Doc	Doc ID	Document Title	Pub Date	Pages	Decision	Proc Date
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
AD03333955	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
AD03334986	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
AD03335307	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
AD03336305	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