KLIMONTOVICH, YU.L.

56-7-19/66

AUTHOR KLIMONTOVICH, Yu.L., TEMKO, S.V.

TITLE A Quantum Kinetic Equation for a Plasma in Consideration of Correlation.
(Kvantovoye kineticheskoye uravneniye dlya plazmy s uchetom korrelyatsii.- Russian)

PERIODICAL Zhurnal Eksperim. i Teoret. Fiziki 1957, Vol 33, Nr 7, pp 132-134 (USSR).

ABSTRACT According to BOGOLYUBOV N.N. the solution of the equations for the density matrix (and correspondingly also for the quantum-like distribution function) can be reduced to the solution of the equationsfor the quantum-like function F_s with classical boundary conditions.
Here $f_s = \gamma_s F_s$ is true, where γ_s denotes the operator of the symmetrisation for n particles. For systems with central interaction the equations for F_1 and F_2 are here explicitly written down. By confining oneself to pairwise correlations,

$$F_2(q_1,q_2,p_1,p_2;t) = F_1(q,p_1;t)F_1(q_2,p_2;t)+g(q_1,q_2,p_1,p_2;t)$$

can be set up and an analogous expression is obtained for F_3. In the case of weak interaction the function g is small

CARD 1/3

compared to the first term.
In the case of shortrange forces and in a domain in which pair interaction suffices, a kinetic equation for the quantum-like distribution function is obtained. This kinetic equation corresponds to the equation for the density matrix which was derived by BOGOLYUBOV and GUROV.
The present paper investigates the first-mentioned equations for F_1 and F_2 only for systems of particles with COULOMB interaction. These equations are specialized here for the following case: The interaction is weak and the correlation radius, which is due to exchange interaction, is smaller than the correlation radius of the COULOMB interaction r_D. The equations derived here at $\hbar \to 0$ go over into the equations contained in § 11 of the well-known monograph by BOGOLYUBOV (Problemy dinamicheskoy theorii v statisticheskoy fizike = Problems of Dynamical Theory in Statistical Physics, Gostekhizdat, 1946). From the equations derived here the quantum-like kinetic equation for the function $F_1(p;t)$ is obtained by means of a transformation and is written down explicitly. In conclusion some special cases are pointed out in short.

KLIMONTOVICH, Yu. L.

"Loss of Energy of Charged Particles on Excitation of a Plasma."
"The Theory of Nonlinear Plasma Oscilallations."

paper presented at Second All-Union Conference on Gaseous Electronics, Moscow, 2-6 Oct '58.

KLIMONTOVICH, YU. L.

56-1-25/56

AUTHOR: Klimontovich, Yu. L.

TITLE: On the Space-Time Correlation Functions of a System of Particles With Electromagnetic Interaction (O prostranstvenno-vremennykh korrelyatsionnykh funktsiyakh sistemy chastits s elektromagnitnym vzaimodeystviyem).

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol. 34, Nr 1, pp. 173-185 (USSR).

ABSTRACT: The present paper determines a closed system of approximate equations for the spatial-temporal correlation functions of a system of particles with electromagnetic interaction. Reference is made to papers dealing with the same subject. In a preliminary paper (reference 6) the author determined a chain of equations for the many-time propagators for a system of particles with central interaction. The present paper uses this method for the investigation of the spatial-temporal correlation functions for a system of particles with electromagnetic interaction in classical treatment. First the Hamiltonian of a classical system of N charged particles is written down. On that occasion the Coulomb calibration was selected in which the Coulomb interaction between the particles can immediately

Card 1/ 3

56-1-25/56

On the Space-Time Correlation Functions of a System of Particles With Electromagnetic Interaction.

be eliminated. In this connection it is also assumed that the charge of the electrons can be compensated by the positive charge of the uniformly distributed ions. A random function is here used in the calculations. A Hamilton equation for the particles and for the variables characterizing the field is derived. The course of the calculation is followed step by step. The author also investigates the case that a stationary, homogeneous random process takes place in the system of the particles with electromagnetic interaction. Immediately from the theorem of Obukhov follows the separation of the correlation function of the currents into a vortex component and into a potential component. Then the author determines equations for the second moments and investigates the solutions of these equations. In the fourth section expressions for the spatial--temporal correlation function of the vector potentials are determined. The microscopic method for the solution of this problem makes it possible the determination of an explicit expression for the dielectric constant. Furthermore more general expressions can be derived by it which are also correct in the presence of a spatial dispersion. The method discussed here is suitable for the investigation of a system quantum-

Card 2/3

On the Space-Time Correlation Functions of a System of Particles With Electromagnetic Interaction. 56-1-25/56

-like, of particles with electromagnetic interaction and for a system of electrons which interact with the vibration of a lattice. There are 14 references, 14 of which are Slavic.

ASSOCIATION: Moscow State University (Moskovskiy gosudarstvennyy universitet).

SUBMITTED: July 17, 1957

AVAILABLE: Library of Congress

Card 3/3

24(5) SOV/56-35-5-12/56

AUTHORS: Klimontovich, Yu. L., Temko, S. V.

TITLE: On Equations of Motion of Particle Systems Which Are in Interaction With Lattice Oscillations (O kineticheskikh uravneniyakh dlya sistem chastits, vzaimodeystvuyushchikh s kolebaniyami reshetki)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 5, pp 1141-1147 (USSR)

ABSTRACT: The authors of the present paper derive the equations of motion for electrons and crystal lattice oscillators by the method developed by Bogolyubov (Refs 1, 2). In connection with the papers by Bardeen, Cooper and Schriffer (Bardin, Kuper, Shriffer) (Ref 3) and Bogolyubov (Ref 4) on superconductivity, an investigation of lattice oscillation of interacting electron systems appears to be of interest. Such an investigation has already been carried out for the spatially homogeneous case (Refs 5, 6); in the homogeneous space the electron distribution function is equal to the equation of motion in Bloch's (Blokh) conductivity theory. The authors of this paper derive a classical approximation for the equation of motion for inhomogenmous electron- and

Card 1/3

SOV/56-35-5-12/56

On Equations of Motion of Particle Systems Which Are in Interaction With Lattice Oscillations

oscillator distribution, which has the shape of a Fokker-Planck (Plank) equation in phase space. Also for the corresponding inhomogeneous quantum distribution function an equation of motion is derived. A Hamiltonian is used as a basis which is set up according to Froehlich (Frelikh)(Ref 12) for the electron system interacting with the crystal lattice oscillations. Herefrom a distribution function is derived in the coordinates and momenta of the electrons and oscillators. The system of approximation equations is set up according to Bogolyubov and Gurov (Ref 2), and solutions are derived. It is shown that the general form of the electron distribution function, if a homogeneous distribution of exchange terms is assumed, goes over into terms corresponding to those of Bloch's theory (Refs 9, 11). Also the equation (average) describing the crystal lattice oscillations is written down for the case of homogeneous electron distribution. Expressions have also been derived for the frequency and the damping decrement of oscillations. The authors finally thank Academician N. N. Bogolyubov and D. N. Zubarev for discussing the work. There

Card 2/3

SOV/56-35-5-12/56

On Equations of Motion of Particle Systems Which Are in Interaction With Lattice Oscillations

are 12 references, 9 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: March 3, 1958 (initially) and Jul. 3, 1958 (after revision)

Card 3/3

21(7) SOV/56-35-5-31/56

AUTHOR: Klimontovich, Yu. L.

TITLE: On a Possible Statistical Description of a System of Particles, Which Are in Interaction With a Field (O vozmozhnom statisticheskom opisanii sistem chastits, vzaimodeystvuyushchikh s polem)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 5, pp 1276-1277 (USSR)

ABSTRACT: The present paper discusses the equations of motion for systems of electrons and oscillators with transversal electromagnetic field for the purpose of investigating the problem of the emission of electromagnetic waves by charged particles in dielectrics and in decelerating media. The charge of the electrons is assumed to be compensated by a uniformly smeared out positively charged background. The state of the system under investigation is determined by the coordinates and momenta of the electrons as well as by the coordinates and momenta of the field oscillators with different wave numbers k. Also a distribution function is introduced, which determines the probabilities of the various states of the system. For the

Card 1/3

SOV/56-35-5-31/56

On a Possible Statistical Description of a System of Particles Which Are in Interaction With a Field

purpose of obtaining the equations of motion of the first distribution functions $f_1(\vec{q},\vec{p};t)$ of the electrons and of the first distribution functions $F_1(Q_k,P_k;t)$ of the field oscillators a corresponding chain of equations is set up, by which the distribution functions of various orders are connected. The higher distribution functions are approximated by the lower ones as in the paper by Bogolyubov and Gurov (Ref 2). If the initial distribution of the field oscillators corresponds to equilibrium, and if the state of the electrons is near equilibrium, an equation of the Fokker-Planck (Plank)-type is obtained in the phase space for the distribution function f_1. This (rather voluminous) equation is explicitly written down and explained. Certain coefficients occurring in this equation are different from zero only if the condition of Cherenkov radiation is satisfied. In the case of equilibrium, this equation satisfies the Maxwell (Maksvell)-condition. If, in the initial state, the electrons are in equilibrium, and if the state of the field oscillators is near equilibrium, an

Card 2/3

SOV/56-35-5-31/56

On a Possible Statistical Description of a System of Particles, Which Are in Interaction With a Field

equation of the Fokker-Planck type is obtained in the phase space of the coordinates and momenta of the field oscillators for the oscillator distribution functions. The solution of this equation corresponding to equilibrium is written down. By means of this equation, an equation for the oscillator coordinates is then obtained. The authors further investigated the more general case in which none of the subsystems (electrons and electromagnetic oscillations) are in a state of thermal equilibrium. The results obtained may be used for the purpose of investigating the emission of electron beams passing through slowing-down systems. The author thanks N. N. Bogolyubov, Academician, for the interest he displayed in this work. There are 4 references, 3 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: April 11, 1958 (initially) and July 5, 1958 (after revision)

Card 3/3

KLIMONTOVICH, Yu. L.

66302

24(2)/30 SOV/109-4-8-22/35

AUTHORS: Granovskiy, V.L., Luk'yanov, S.Yu., Spivak, G.V. and Sirotenko, I.G.

TITLE: Report on the Second All-Union Conference on Gas Electronics

PERIODICAL: Radiotekhnika i elektronika, 1959, Vol 4, Nr 8, pp 1339 - 1354 (USSR)

ABSTRACT: The conference was organized by the Ac.Sc.USSR, the Ministry of Higher Education and Moscow State University.

A.A. Zaytsev - "Measurement of the Gas Density During the Dynamic Operation of a Discharge" (see p 1306 of the journal).A.V. Nedospasov - The Nature of a Striated Positive Column".

V.L. Fedorov and Yu.M. Kagan - "The Theory of Probes for Arbitrary Pressures".

Yu.M. Kagan et al. - "The Positive Column of a Discharge in a Diffusion Region".

M.V. Konyukov - "Influence of the Processes of the Annihilation of the Negative Ions on Their Concentration in the Column".

M.D. Gabovich and L.L. Pasechnik - "Anomalous Scattering, Excitation of Plasma Oscillations and Plasma Resonance"

Yu.L. Klimontovich - "Energy Lost by Charged Particles for the Excitation of the Oscillations in Plasma (the Langmuir paradox)" and "The Theory of Non-linear Plasma Oscillations".

Yu.G. Martinkov and I.G. Nekrashevich - "Dependence of the Temperature in the Near-electrode Region of a Pulse Discharge on the Material of the Electrodes".

N.A. Karelina and S.M. Rivlin - "Formation of Light Spots on the Anode of a Gas Discharge (see p 1361 of the journal).

N.A. Matveyeva -"Distribution of Binary Mixtures of Inert Gases in a d.c. Discharge".

V.G. Stepanov and V.F. Zakharchenko - "Some Phenomena in Rarified Plasma".

V.G. Stepanov and V.I. Rozal' - "The Possibility of Obtaining Highly Concentrated Plasmas".

G.V. Smirnitskaya and S.M. Reykhrudel' - "Some Characteristics of the Discharge in an Ion Pump and in a Magnetic Ionization Vacuum Gauge".

Ye.T. Kucherenko and O.K. Nazarenko - "Properties of a Discharge with Electron Oscillations in a Magnetic Field" (see p 1293 of the journal).

The paper by L.M. Biberman and B.A. Veklenko considered the approximate methods for determining the concentration of atoms at the radiation levels.

I.I. Sobel'man and L.A. Vaynshteyn read a paper on "A Non-stationary Theory of the Stark Broadening of the Spectral Lines in Plasma".

M.A. Mazing and S.L. Mandel'shtam - "The Broadening and the Shift of Spectral Lines in a Gas-discharge Plasma".

[illegible] (England) - "The Kinetics of Electron Collisions Leading to the Excitation of the Molecular Hydrogen in a Hydrogen Discharge".

V.S. Kolesnikov et al. - "Some Properties of the Arc Discharge in an Atmosphere of Inert Gases".

A.A. Mak and N.S. Kozyrev - "Production of High Temperatures By Means of Spark Discharges".

Card 1/7

21(7)

AUTHOR: Klimontovich, Yu. L. SOV/56-36-5-15/76

TITLE: The Energy Losses of Changed Particles Due to Excitation of Plasma Oscillations (Poteri energii zaryazhennykh chastits na vozbuzhdeniye kolebaniy v plazme)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 5, pp 1405-1416 (USSR)

ABSTRACT: When calculating the energy losses of electrons moving in a plasma such losses as are due to short-range interactions (electron-electron collisions) are usually investigated separately from those occurring as a result of plasma oscillation excitation. This practice was followed also in this case. For short-range interaction $F_1 = (e\omega_L/v_o)^2 \ln(r_d/a)$ is set up for the damping force, and for long-range interaction $F_2 = (e\omega_L/v_o)^2 \ln(v_o/v_r)$ is set up. Here e denotes the electron charge, ω_L - Langmuir frequency, v_o - electron velocity, $a = e^2/mv_o^2$, r_d - Debye distance.

Card 1/3

The energy losses occurring as a result of these two effects

are thus of the same order of magnitude. At certain conditions the energy transfer of nonequilibrium electrons on plasma electrons takes place at distances which are considerably smaller than the relaxation lengths, which are calculated by means of the $F_{1,2}$-formulas. The existence of this effect (Langmuir effect) shows that the problem of electron deceleration can not be solved for all cases on the basis of the equation of motion investigated in the first part of this paper. It must be assumed that the state of the electrons in the plasma as well as that of plasma oscillations may assume equilibrium, a condition which is no longer satisfied already at greater concentrations of nonequilibrium electrons (e. g. in the case of an electron beam penetrating the plasma). For such cases a system of nonlinear equations describing a beam + plasma is set up and solved in the second part of this paper. The beam electrons and the plasma oscillations are considered to be two sub-systems. Investigation by means of the equation of motion furnishes an expression for the damping force,

The Energy Losses of Changed Partiales Due to ... SOV/56-36-5-15/76
Excitation of Plasma Oscillations

which takes the energy losses due to electron-electron collisions as well as such due to the excitation of plasma oscillations into account. In the more general case, in which neither of the two sub-systems must be in thermal equilibrium, solution of the system of equations for the beam electron distribution function and the electric potential supplies an explanation for the rapid energy transfer from beam electrons to plasma electrons, such as was observed for the first time by Langmuir. The author finally thanks Academician N. N. Bogolyubov and R. V. Khokhlov for their valuable advice and interest in this work. There are 22 references, 16 of which are Soviet.

ASSOCIATION Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: October 10, 1958

Card 3/3

24(5), 21(7)

AUTHOR: Klimontovich, Yu. L. SOV/56-37-3-22/62

TITLE: Relativistic Equations of Motion for a Plasma I

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 3(9), pp 735 - 744 (USSR)

ABSTRACT: Whereas it is possible, in the nonrelativistic range, to work with Bogolyubov's approximation method (Ref 1), there are various approximation possibilities in the relativistic case for the distribution functions and for obtaining equations of motion: the equation with the selfconsistent field, the Fokker-Planck equation, the equation of motion in consideration of radiation, etc. The present paper is intended to investigate these problems. Besides the author (Ref 2) only few people have hitherto occupied themselves with the relativistic equation of motion in plasma, among others also Belyayev and Budker (Coulomb interaction, Landau's equation of motion), as well as A. A. Vlasov. The author himself derived the equation of motion for the distribution functions of charged particles in the electromagnetic field in reference 2. He set up the relativistic dispersion equation for transversal and longitudinal waves in selfconsistent approximation for the distribution function of

Card 1/3

Relativistic Equations of Motion for a Plasma I SOV/56-37-3-22/62

the eight variables, and derived the relativistic equation for the quantum distribution function for scalar charged particles and electrons, and also the relativistic quantum equation with selfconsistent field for scalar charged particles. In the present paper the interrelation between the definitions of state probability and distribution function is investigated by using the previously obtained results on the basis of the equation of motion for charged particles in an external electromagnetic field. A random function is introduced, which defines the number of particles in a phase space cell; the electromagnetic field strength or number of oscillators are also considered as random functions. The equation set for these functions may be used as a basis for the deduction of the equation chain relating to the moments of the random functions or the corresponding distribution functions of various orders. A set of relativistic selfconsistent equations has been derived by approximating this equation chain. In the last part of the paper relativistic expressions are derived for the dispersions of longitudinal and transversal plasma waves in approximation of the selfconsistent field. The author thanks Academician

Card 2/3

Relativistic Equations of Motion for a Plasma I SOV/56-37-3-22/62

N. N. Bogolyubov for discussions. There are 16 references, 12 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: March 27, 1959

Card 3/3

83731

S/056/60/038/004/024/048
B006/B056

26.2311
24.2120

AUTHOR: Klimontovich, Yu. L.

TITLE: A Relativistic Equation of Motion for a Plasma. II

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 4, pp. 1212 - 1221

TEXT: The present paper is the immediate continuation of the earlier paper mentioned under Ref. 1. The results obtained by the latter are used for the purpose of deriving a classical equation of motion for a plasma in second approximation, which is the relativistic counterpart of the equation obtained by N. N. Bogolyubov (Ref. 3). A special case of such an equation (without emission and pair-production being taken into account) was studied by S. T. Belyayev and G. I. Budker (Ref. 2); for $c \to \infty$ the latter goes over into the equation by L. D. Landau (Ref. 4). First, a kinetic equation taking only the retarded interaction of charged particles into account (and neglecting emission effects) is derived; for this purpose the author proceeds from equations (12) and (13) (of Ref. 1). It is shown that this equation in a special case is identical with that

Card 1/2

83731

A Relativistic Equation of Motion for a Plasma. II S/056/60/038/004/024/048 B006/B056

of Belyayev and Budker. Another possibility of deriving this relativistic equation of motion is briefly discussed. In a second part of this paper, the relativistic equation of motion by Fokker-Planck is investigated, taking the retarded interaction of the particles and the excitation of plasma oscillations by nonequilibrium charged particles into account. In this case it is thus not assumed (like in the Fokker-Planck equation of motion) that the number of fast (non-equilibrium) particles penetrating the plasma is very low. Taking diffusion effects and the emission of plasma waves into account, the new relations are obtained. In a following paper, the chains of relativistic equations here obtained are used for the distribution functions for the purpose of deriving the equations of motion in the presence of external fields, as well as for obtaining a hydrodynamic approximation. The author finally thanks Academician N. N. Bogolyubov for his interest and discussions. There are 11 references: 8 Soviet, 2 US, and 1 British.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: October 24, 1959

Card 2/2

24.2120

68697

AUTHORS: Klimontovich, Yu. L., Silin, V. P. S/053/60/070/02/005/016
B006/B007

TITLE: The Spectra of Systems of Interacting Particles and the Collective Losses in the Passage of Charged Particles Through Matter

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol 70, Nr 2, pp 247-286 (USSR)

ABSTRACT: The present survey deals with two essentially closely connected problems: The spectra of collective excitations in systems of interacting particles, and the energy losses in the excitation of collective oscillations when charged particles penetrate matter. In the case of a system of strongly interacting particles (liquid, solid, plasma, or nuclear matter) energy levels and states for the system as a whole may be investigated; the investigation of such level spectra is, in itself, rather complicated; the simplest case is that of weakly excited states, i.e. of minor deviations from equilibrium, e.g. ion oscillations relative to the lattice points in a crystal (phonons). Phonons, plasmons and the like are called quasiparticles in quantum mechanics; the momentum dependence on its energy and the dependence of frequency on the wave number is

Card 1/4

68697

The Spectra of Systems of Interacting Particles and the Collective Losses in the Passage of Charged Particles Through Matter

S/053/60/070/02/005/016
B006/B007

in the following called excitation spectrum. Such excitations occur as sound waves in solids, as phonon-roton-excitations in superfluid helium, and as spin waves. The latter are an example of Bose excitations occurring in a particle system concurring with Fermi statistics. The analoga of the elementary Bose excitations in classical physics are the wave processes, as e.g. the propagation of longitudinal plasma waves. Paragraphs 3 - 5 of the present paper deal with the investigation of excitation spectra in systems of charged particles; the investigation is based upon the equations of the quantum-distribution function (density matrix)derived in paragraph 1. In paragraph 6 the problem of energy losses during the passage of fast charged particles through matter, which are due to the excitation by collective oscillations,is investigated. In matter, electromagnetic oscillations are excited whose spectra are fixed by the dielectric constant of the medium. The formulas derived in paragraph 6 for the purpose of describing the energy losses do not, however, in all cases reproduce the experimental results obtained, as, e.g., not in the case of the Langmuir-

Card 2/4

paradox. In order to be able to investigate also such cases, a further possibility was dealt with in paragraph 2, which makes it possible to investigate the energy losses of charged particles passing through a plasma; this possibility is based upon the use of equations of motion which describe also the energy losses of particles for the excitation of collective oscillations. If the particles entering the plasma do not essentially influence its properties, the expressions derived here for the stopping power coincide with those of paragraph 6. This condition is, however, not satisfied when an intense electron beam enters the plasma; and the system of nonlinear equations for the electrons of the beam and those of the plasma must be satisfied simultaneously. In paragraph 7 the solution of such a special case is discussed. The results obtained essentially describe the conditions found by Langmuir. The individual paragraphs deal with the following: Paragraph 1: Derivation of the equation for the quantum-distribution function (Bose statistics); paragraph 2: the equation of motion for the quantum-distribution function; paragraph 3: the spectra of collective oscillations in self-consistent field approximation; paragraph 4: the influence

68697

The Spectra of Systems of Interacting Particles and the Collective Losses in the Passage of Charged Particles Through Matter

S/053/60/070/02/005/016
B006/B007

of the correlations of particles upon the spectra of collective oscillations (microscopical observation method); paragraph 5: the influence exerted by the correlations of particles upon the spectra of collective excitations. A phenomenological theory of the Fermi degenerate electron fluid; paragraph 6: the losses of charged particles passing through matter, which are interrelated with the excitation of collective oscillations in the medium; paragraph 7: the nonlinear effects during the passage of charged particles through a plasma. The following Soviet scientists are mentioned: N. N. Bogolyubov, K. P. Gurov, A. A. Vlasov, L. D. Landau, P. A. Cherenkov, P. S. Zyryanov, Ye. L. Feynberg, D. N. Zubarev, V. M. Yeleonskiy, I. I. Gol'dman, V. A. Fok, I. M. Frank, and I. Ye. Tamm. There are 109 references, 61 of which are Soviet.

Card 4/4

STRATONOVICH, R.L.; KLIMONTOVICH, Yu.L., nauchnyy red.,dots.;IVANUSHKO,N.D., red.; SVESHNIKOV, A.A., tekhn. red.

[Selected problems concerning the theory of fluctuations in radio engineering] Izbrannye voprosy teorii fliuktuatsii v radiotekhnike. Moskva, Izd-vo "Sovetskoe radio," 1961. 557 p. (MIRA 14:12)
(Radio)

KLIMONTOVICH, Yu.L.; SILIN, V.P.

Magnetohydrodynamics for a nonisothermal plasma without collisions. Zhur. eksp. i teor. fiz. 40 no.4:1213-1223 Ap '61. (MIRA 14:7)

1. Moskovskiy gosudarstvennyy universitet i Fizicheskiy institut imeni P.N. Lebedeva AN SSSR.
(Magnetohydrodynamics) (Plasma (Ionized gases))

S/056/62/042/001/043/048
B102/B108

AUTHORS: Klimontovich, Yu. L., Silin, V. P.

TITLE: Theory of fluctuations in particle distribution in a plasma

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 1, 1962, 286 - 298

TEXT: The correlations $\overline{\delta N_\alpha(\vec{r}_\alpha, \vec{p}_\alpha, t)\, \delta N_\beta(\vec{r}_\beta, \vec{p}_\beta, t')}$ of the phase density functions $N_\alpha = \sum_i \delta(\vec{r}_\alpha - \vec{r}_{\alpha i}(t))\, \delta(\vec{p}_\alpha - \vec{p}_{\alpha i}(t))$ for quasi-equilibrium states of a collision-free plasma are calculated. Quasi-equilibrium means that the mean values of N_α do not change considerably at distances of the order of the correlation radius and over periods of the order of the correlation time. The method used has been developed by Yu. L. Klimontovich (DAN SSSR, 96, 43, 1954; ZhETF, 33, 982, 1957). The equations for the phase density fluctuations was used also by B. B. Kadomtsev (ZhETF, 32, 943, 1957). The problem

$$N_a(r_a, p_a, t) = \sum_i \delta(r_a - r_{ai}(t))\, \delta(p_a - p_{ai}(t)) \qquad (A),$$

Card 1/5

or better $$\frac{\partial \delta N_\alpha}{\partial t} + v_\alpha \frac{\partial \delta N_\alpha}{\partial r_\alpha} - n_\alpha \sum_\beta \int dp_\beta dr_\beta \frac{\partial U_{\alpha\beta}(|r_\alpha - r_\beta|)}{\partial r_\alpha} \delta N_\beta \frac{\partial f_\alpha}{\partial p_\alpha} = 0. \qquad (1.3)$$

with $\delta N = N_\alpha - \bar{N}_\alpha$ is solved with the initial condition $\delta N_\alpha(\vec{r}_\alpha, \vec{p}_\alpha, t) = \delta N_\alpha(\vec{p}_\alpha, \vec{r}_\alpha, 0)$ for $t = 0$:

$$\begin{aligned} \delta N_\alpha (r_\alpha, p_\alpha, t) &= \delta N_\alpha (P_\alpha (0, t, p_\alpha), R_\alpha (0, t, p_\alpha, 0), 0) + \\ &+ \frac{i}{(2\pi)^4} \sum_\gamma \frac{4\pi e_\alpha e_\gamma n_\alpha}{k^2} \int d\omega e^{-i\omega t} \int dk e^{ik(r_\gamma - r_\alpha)} \int dp_\gamma dr_\gamma \frac{1}{\varepsilon^{(+)}(\omega, k)} \times \\ &\times \int_0^\infty d\tau \exp \{i (\omega\tau + kR_\alpha (0, \tau, p_\alpha, 0))\} k \frac{\partial f_\alpha (P_\alpha (0, \tau, p_\alpha))}{\partial P_\alpha} \times \\ &\times \int_0^\infty d\tau' \exp \{i (\omega\tau' - kR_\gamma (\tau', 0, p_\gamma, 0))\} \delta N_\gamma (p_\gamma, r_\gamma, 0). \end{aligned} \qquad (1.12).$$

These solutions are used to calculate the mean values of products of an arbitrary number of functions δN_α. This is done for

$$\overline{\delta N_\alpha(\mathbf{r}_\alpha, \mathbf{p}_\alpha, t)\,\delta N_\beta(\mathbf{r}_\beta, \mathbf{p}_\beta, 0)} =$$
$$= \frac{1}{(2\pi)^4}\int d\omega \int d\mathbf{k} \exp\{-i(\omega t - \mathbf{k}(\mathbf{r}_\alpha - \mathbf{r}_\beta))\}\,(\delta N_\alpha(\mathbf{p}_\alpha)\,\delta N_\beta(\mathbf{p}_\beta))^{(+)}_{\omega,\mathbf{k}}. \quad (2.1)$$

$$(\delta N_\alpha(\mathbf{p}_\alpha)\,\delta N_\beta(\mathbf{p}_\beta))^{(+)}_{\omega,\mathbf{k}} = \frac{i}{(\omega - \mathbf{k}\mathbf{v}_\alpha + i\Delta)}\Big\{\delta_{\alpha\beta}\delta(\mathbf{p}_\alpha - \mathbf{p}_\beta)\,n_\beta f_\beta(\mathbf{p}_\beta) + n_\alpha n_\beta G_{\alpha\beta}(\mathbf{k}, \mathbf{p}_\alpha, \mathbf{p}_\beta) -$$
$$- \frac{4\pi e_\alpha}{k^2}\,n_\alpha\,\mathbf{k}\,\frac{\partial f_\alpha}{\partial \mathbf{p}_\alpha}\frac{1}{\varepsilon^{(+)}(\omega, \mathbf{k})}\Big[\frac{e_\beta n_\beta f_\beta(\mathbf{p}_\beta)}{\omega - \mathbf{k}\mathbf{v}_\beta + i\Delta} + \sum_\gamma \int d\mathbf{p}_\gamma \frac{e_\gamma n_\gamma n_\beta G_{\gamma\beta}(\mathbf{k}, \mathbf{p}_\gamma, \mathbf{p}_\beta)}{\omega - \mathbf{k}\mathbf{v}_\gamma + i\Delta}\Big]\Big\}. \quad (2.2)$$

The Fourier component of the binary correlation function is

$$G_{\alpha\beta}(\mathbf{k}, \mathbf{p}_\alpha, \mathbf{p}_\beta) = \frac{1}{\mathbf{k}(\mathbf{v}_\alpha - \mathbf{v}_\beta) - i\Delta}\frac{4\pi e_\alpha e_\beta}{k^2}\Big\{\mathbf{k}\frac{\partial f_\alpha}{\partial \mathbf{p}_\alpha}\frac{f_\beta}{\varepsilon^{(+)}(\mathbf{k}\mathbf{v}_\beta, \mathbf{k})} -$$
$$- \mathbf{k}\frac{\partial f_\beta}{\partial \mathbf{p}_\beta}\frac{f_\alpha}{\varepsilon^{(-)}(\mathbf{k}\mathbf{v}_\alpha, \mathbf{k})} + \Big(\mathbf{k}\frac{\partial f_\alpha}{\partial \mathbf{p}_\alpha}\Big)\Big(\mathbf{k}\frac{\partial f_\beta}{\partial \mathbf{p}_\beta}\Big)\sum_\gamma \frac{4\pi e_\gamma^2 n_\gamma}{k^2}\int d\mathbf{p}_\gamma \frac{f_\gamma(\mathbf{p}_\gamma)}{|\varepsilon(\mathbf{k}\mathbf{v}_\gamma)|^2} \times \quad (2.3)$$
$$\times \Big[\frac{1}{\mathbf{k}(\mathbf{v}_\beta - \mathbf{v}_\gamma) + i\Delta} - \frac{1}{\mathbf{k}(\mathbf{v}_\alpha - \mathbf{v}_\gamma) - i\Delta}\Big]\Big\}.$$

and can be represented through charge fluctuations

$$G_{\alpha\beta}(\mathbf{k}, \mathbf{p}_\alpha, \mathbf{p}_\beta) = \frac{1}{\mathbf{k}(\mathbf{v}_\alpha - \mathbf{v}_\beta) - i\Delta} \frac{4\pi e_\alpha e_\beta}{k^2} \Big\{ \mathbf{k}\frac{\partial f_\alpha}{\partial \mathbf{p}_\alpha} \frac{f_\beta}{\varepsilon^{(+)}(\mathbf{k}\mathbf{v}_\beta, \mathbf{k})} - \mathbf{k}\frac{\partial f_\beta}{\partial \mathbf{p}_\beta} \frac{f_\alpha}{\varepsilon^{(-)}(\mathbf{k}\mathbf{v}_\alpha, \mathbf{k})} -$$

$$- i\frac{4\pi}{k^2}\left(\mathbf{k}\frac{\partial f_\alpha}{\partial \mathbf{p}_\alpha}\right)\left(\mathbf{k}\frac{\partial f_\beta}{\partial \mathbf{p}_\beta}\right)\left[(\delta\rho\delta\rho)^{(+)}_{\mathbf{k}\mathbf{v}_\beta, \mathbf{k}} - (\delta\rho\delta\rho)^{(-)}_{\mathbf{k}\mathbf{v}_\alpha, \mathbf{k}}\right]\Big\}. \qquad (2.12)$$

These charge fluctuation functions are also used to express the remaining correlation functions. The functions $\overline{\delta N_\alpha(\vec{r}_\alpha, \vec{p}_\alpha, t)\, \delta N_\beta(\vec{r}_\beta, \vec{p}_\beta, 0)}$ are determined for a plasma in a constant and uniform magnetic field. The formulas derived are applied to the investigation of an equilibrium plasma with Maxwellian distribution functions $f_\alpha(\vec{p}_\alpha)$. A. I. Akhiyezer, I. A. Akhiyezer and A. G. Sitenko (ZhETF, 41, 644, 1961) are mentioned. There are 8 references: 5 Soviet and 3 non-Soviet. The two references to English-language publications read as follows: J. Hubbard. Proc. Roy. Soc. A260, 114, 1961; R. Balescu, H. Taylor. Phys. of fluids, 4, 85, 1961.

34019

Theory of fluctuations in particle ... S/056/62/042/001/043/048
B102/B108

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University) Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute imeni P. N. Lebedev of the Academy of Sciences, USSR)

SUBMITTED: August 31, 1961

X

Card 5/5

39666

S/056/62/043/001/022/056
B102/B108

24.2120

AUTHORS: Klimontovich, Yu. L., Ebeling, V.

TITLE: Hydrodynamic description of the motion of charged particles in a weakly ionized plasma

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 1(7), 1962, 146 - 152

TEXT: A weakly ionized plasma is considered whose oscillation frequency ω_L is smaller or of the order of the collision frequency ν: $\omega_L \lesssim \nu$ and $\omega_L \mu \ll \nu$; μ $e^2/r_d kT$. In this case the hydrodynamic equations can be obtained by a method described by Born and Green (Proc. Roy. Soc. 188, 10, 1946) or from the equations for random phase densities (Klimontovich, ZhETF, 33, 982, 1957). The latter method is used here. It leads to a system of equations which unlike the usual hydrodynamic equations contains also an equation for the spatial correlation functions. This system can be used for describing non-equilibrium processes also if variations with time of the spatial spectrum predominate, and if mean velocity and density are
Card 1/2

virtually constant. The effect of weak ionization is explicitly described for the case that ρ and T of the neutral particles are constant, the mean is velocity zero and the momentum distribution is almost Maxwellian. The relations obtained are used for describing a homogeneous electron plasma with $\vec{E}_0 = 0$ and a homogeneous weakly ionized plasma in a weak variable field $E = E_0 e^{i\omega t}$. Also the case of a uniform random field $\vec{E}_0$ is considered, assuming that the mean value of $\vec{E}_0$ be zero, whilst $E_0^2 \neq 0$.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: January 11, 1962

38609

S/020/62/144/005/005/017
B125/B104

24.6712

AUTHOR: Klimontovich, Yu. L.

TITLE: Kinetic description of turbulent quasi-equilibrium processes in plasma

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 144, no. 5, 1962, 1022-1025

TEXT: The kinetic equation for turbulent quasi-equilibrium processes in plasma is derived from the correlation $\overline{(\delta N_a \delta E)}$ between the functions $\delta N_a = N_a - \overline{N}_a$ and $\delta \vec{E} = \vec{E} - \overline{\vec{E}}$, where N_a is the number of particles of component a. In linear approximation it is possible to write the equations for δN_a and $\delta \vec{E}$ in the form

$$\frac{\partial^2 \delta E}{\partial t^2} + \omega_L^2 \delta E = 4\pi \sum_a e_a \int v \left(v \frac{\partial}{\partial q} \right) \delta N_a dp, \quad \omega_L^2 = \sum_a \frac{4\pi e_a^2 n_a}{m_a}. \qquad (4)$$

Card 1/3

Solutions are analyzed in which the spectral functions depend only on the distribution function $f_a(\vec{p},t)$ and on $(\delta\vec{E}\delta\vec{E})^{(u)}_{\vec{k}}$. $(\delta N_a \delta\vec{E})_{\vec{k}}$ and $(\delta\vec{E}\delta\vec{E})_{\vec{k}}$ are the Fourier components of the functions $\delta N_a(\vec{q},\vec{p},t)\delta\vec{E}(\vec{q}',t)$ and $\delta\vec{E}(\vec{q},t)\delta E(\vec{q}',t)$. Thus one obtains

$$\frac{\partial}{\partial t}(\delta E\,\delta E)^{(u)}_k = \pi \sum_a \frac{(4\pi)^2 e_a^2 n_a}{k^2} \int B(kv,k)\left\{\frac{(\delta E\delta E)^{(u)}_k}{4\pi} k \frac{\partial f_a}{\partial p} + (kv) f_a\right\} dp \equiv 8\pi P_k. \quad (13)$$

where

$$B(\omega,k) = \Delta \frac{\partial}{\partial\omega} \varepsilon'(\omega,k) / \pi \left[\left(\varepsilon' - \Delta\frac{\partial\varepsilon''}{\partial\omega}\right)^2 + \left(\varepsilon'' + \Delta\frac{\partial\varepsilon'}{\partial\omega}\right)^2\right]. \quad (7)$$

and, for small values of k,

$$B(\omega,k) = \operatorname{sign}\left[\frac{\partial}{\partial\omega}\varepsilon'(\omega,k)\right]\delta(\varepsilon'(\omega,k)) \text{ при } \Delta\to 0. \quad (8).$$

These equations describe the time variation of a homogeneous turbulence

Card 2/3

in plasma. If the plasma waves absorb considerable amounts of energy, a Maxwellian velocity distribution will be brought about by the redistribution of energy in the spectrum. The correlation is then determined by the Debye correlation function. In the non-equilibrium case, the space-time spectral functions cannot completely be expressed by the first distribution functions f_a. The space-time correlation functions obtained here can also be used to describe non-steady states. The equations derived here can be extended to the case of a weakly inhomogeneous plasma and are suitable for deriving hydrodynamic equations allowing for the emission of plasma waves. V. P. Silin is thanked for critical remarks.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University im. M. V. Lomonosov)

PRESENTED: February 9, 1962, by N. N. Bogolyubov, Academician

SUBMITTED: February 7, 1962

S/020/62/145/004/010/024
B178/B102

24.2120

AUTHORS: Klimontovich, Yu. L., and Silin, V. P.

TITLE: Fluctuations in collision-free plasma

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 145, no. 4, 1962, 764-767.

TEXT: A fluctuation theory of the distribution functions in a collision-free plasma is developed in continuation of the papers by Yu. L. Klimontovich (ZhETF, 37, 735, 1959; 38, 1212, 1960; 33, 982, 1957; 34, 173, 1958;), allowing not only for the Coulomb interaction of the particles but also for a transverse electric field. The space-time spectral functions are obtained without previously determining the correlation functions. Thus the problem can be simplified. Formulas for the fluctuations δE and δN in the spatially isotropic case are calculated. For the special case of isotropic momentum distribution in the constant magnetic field a formula is derived for the collision integral. For the Maxwellian distribution of the particles at equal temperatures a simple expression is obtained for the Debye screening.

Card 1/2

Fluctuations in collision-free plasma

S/020/62/145/004/010/024
B178/B102

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: February 17, 1962, by M. A. Leontovich, Academician

SUBMITTED: October 24, 1961

B

Card 2/2

S/126/62/014/004/004/017
E032/E314

AUTHOR: Klimontovich, Yu.L.

TITLE: On the statistical theory of processes in a system of electrons interacting with lattice vibratations

PERIODICAL: Fizika metallov i metallovedeniye, v. 14, no. 4, 1962, 512 - 516

TEXT: The aim of this work was to give a brief account of a method which may be used to obtain a statistical description of quasi-equilibrium processes in a system of interacting electrons and phonons. The analysis is confined to the classical approximation; the quantum theory will be given in another paper. The starting point of the analysis is the Hamiltonian

$$H = \int \frac{p^2}{2m} N(q, p, t)\, dq\, dp + C \int N \operatorname{div} u(q, t)\, dq\, dp + + \frac{Mn}{2} \int (\dot{u}^2 + s^2 (\operatorname{div} u)^2)\, dq. \quad (1)$$

where $N(q, p, t) = \sum_{1 \le i \le N} \delta(q - q_i(t)) \times \delta(p - p_i(t))$ is the

Card 1/2

APPROVED FOR RELEASE: 09/18/2001 CIA-RDP86-00513R000723120011-4"

microscopic electron phase density, u(q, t) is the longitudinal lattice displacement, C is the interaction constant, n is the average ion density and s is the velocity propagation of sound waves in the lattice in the absence of interaction with electrons. The functions N and u are looked upon as random functions and equations for them have been given by D.N. Zubarev (UFN, 1960, 71, No. 1). General expressions are now obtained for the departure of N and u from their average values and for the corresponding correlation functions. It is assumed that the average electron distribution is almost uniform ($\bar{u}$ = 0) and the electron-phonon interaction is weak. The analysis may be generalized to the case of a more exact Hamiltonian and steps are indicated as to how this may be done. The paper is entirely theoretical.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova (Moscow State University im. M.V. Lomonosov)

SUBMITTED: May 17, 1962

KLIMONTOVICH, Yu.L.; SILIN, V.P.

Fluctuations in a plasma without collisions. Dokl.AN SSSR 145 no.4:764-767 Ag '62. (MIRA 15:7)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova. Predstavleno akademikom M.A.Leontovichem.
(Plasma (Ionized gases))

KLIMONTOVICH, Yu.L.

Kinetic description of turbulent quasi-equilibrium processes in a plasma. Dokl. AN SSSR 144 no.5:1022-1025 Je '62. (MIRA 15:6)

1. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova. Predstavleno akademikom N.N.Bogolyubovym.
(Plasma (Ionized gases))

KLIMONTOVICH, Yu.L.; EBELING, V.

Hydrodynamic description of the motion of charged particles in a weakly ionized plasma. Zhur. eksp. i teor. fiz. 43 no.1:146-152 Jl '62. (MIRA 15:9)

1. Moskovskiy gosudarstvennyy universitet.
(Plasma (Ionized gases))

KLIMONTOVICH, YU. L.

Dissertation defended for the degree of Doctor of Physicomathematical Sciences at the Mathematical Institute imedi V. A. Steklova 1962:

"Several Problems of Statistical Theory of Nonequilibrium Processes in Plasma."

Vest. Akad. Nauk SSSR. No. 4, Moscow, 1963, pages 119-145

KLIMONTOVICH, Yu. L.

Statistical theory of nonequilibrium processes in the system of electrons interacting with lattice vibrations. Fiz. met. i metalloved. 14 no.4:512-516 O '62. (MIRA 15:10)

1. Moskovskiy gosudarstvennyy universitet imeni M. V. Lomonosova.

(Crystal lattices) (Electrons)

KLIMONTOVICH, Yu.L.

Statistical theory of homogeneous isotropic turbulence in a relativistic plasma. Dokl. AN SSSR 147 no.5:1063-1066 D '62. (MIRA 16:2)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova. Predstavleno akademikom N.N. Bogolyubovym.
(Plasma (Ionized gases)) (Turbulence)

KLIMOV, A.N., otv. red.; DEMANNIKOV, V.G., red.; SPEKTOR, S.A., red.

[Electric measuring techniques and automatic control; studies of postgraduate students and degree candidates] Elektroizmeritel'naia tekhnika i avtomatika; uchenye zapiski aspirantov i soiskatelei. Leningrad, 1963. 109 p.

[Electrical machinery and automated electric drives; studies of postgraduate students and degree candidates] Elektricheskie mashiny i avtomatizirovannyi elektroprivod; uchenye zapiski aspirantov i soiskatelei. Leningrad, 1963. 140 p. (MIRA 17:12)

1. Leningrad. Politekhnicheskiy institut.

S/207/63/000/001/002/028
E202/E592

AUTHOR: Klimontovich Yu.L. (Moscow)

TITLE: Statistical theory of turbulence in a plasma

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no.1, 1963, 14-25

TEXT: Starting with a system of microscopic plasma state equations in which the values of the microscopic phase densities are known for each plasma component as well as the values of electric and magnetic field potentials (E^* and H^*, respectively), a closed system of equations for the phase density N_a, E^* and H^* is given. This approach permits reducing the problem of the statistical theory of non-equilibrium plasma processes to determination of random functions of the three parameters, which may be expressed through any plasma characteristics, e.g. the first moments. This treatment leads to a set of first distribution functions f_a, i.e. kinetic equations. Formulating further conditions for the solution of the correlation functions of the component particles g_{ab}, an approximate maximum correlation time τ_{max} is found; also that $\partial f_a/\partial t \ll fa/\tau_{max}$. A case in which

Card 1/2

Statistical theory of ... S/207/63/000/001/002/028
E202/E592

the temperature of plasma oscillators $T^{*}(k)$ is constant and independent of k is also considered and found to correspond to the Landau approximation. The author develops equations describing homogeneous turbulence in the case of Coulomb plasma, and N_a and E^{*} random functions from the microscopic equations and points to certain discrepancies between the present results and those of Yu. A. Romanov and G. F. Filippov (ZhETF, 1961, v.40, 123). In the analysis of the developed relations it is shown that there are two processes leading to the establishment of a Maxwell distribution, viz. the collision and radiation of plasma waves, each of which has different relaxation times. The hydrodynamic plasma equation is discussed, taking into consideration the radiation of plasma waves and the case of spatial nonhomogeneity using the very approximate quasilinear equations.

SUBMITTED: November 15, 1962

Card 2/2

KLIMONTOVICH, YU.L. (Moscow)

"On the statistical theory of non-equilibrium processes in plasma"

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 Jan - 5 Feb 64.

L 19861-65 EWT(1)/EWG(k)/EPA(sp)-2/EPA(w)-2/EAC(t)/T/EEC(b)-2/EWA(m)-2
Pz-6/Po-4/Pab-10/Pi-4 IJP(c)/AEDC(b)/SS [illegible] AT/WLK

ACCESSION NR AM5001447 BOOK EXPLOITATION S/

Klimontovich, YUriy L'vovich

Statistical theory of nonequilibrium processes in plasma (Statisticheskaya teoriya neravnovesny'kh protsessov v plazme), Moscow, Izd-vo Mosk. univ., 1964, 280 p. biblio. 3,350 copies printed.

TOPIC TAGS: nonequilibrium plasma process, plasma wave, plasma physics, Maxwell equation, Vlasov equation

TABLE OF CONTENTS [abridged]:

Card 1/2

L 19861-65
ACCESSION NR AM5001447

Bibliography -- 276

SUB CODE: EM SUBMITTED: 08Aug64 NR REF SOV: 033

OTHER: 003

Card 2/2

AKHMANOV, S.A.; KHOKHLOV, R.V.; KLIMONTOVICH, Yu.L., doktor fiz.-matem.nauk, otv. red.

[Problems in nonlinear optics; electromagnetic waves in nonlinear dispersive media, 1962-1963] Problemy nelineinoi optiki; elektromagnitnye volny v nelineinykh dispergiruiushchikh sredakh, 1962-1963. Moskva, In-t nauchn. informatsii, 1964. 294 p. (MIRA 17:11)

ACCESSION NR: AP4042788 S/0020/64/157/003/0563/0565

AUTHOR: Klimontovich, Yu. L.

TITLE: On the statistical theory of nonequilibrium processes in a plasma (account of nonlinear interaction of waves in the kinetic equations)

SOURCE: AN SSSR. Doklady*, v. 157, no. 3, 1964, 563-565

TOPIC TAGS: plasma dynamics, nonlinear plasma, plasma wave, kinetic theory, coherent scattering

ABSTRACT: The kinetic equations for a plasma, with allowance for the nonlinear interaction of the waves, are considered for two extreme cases: 1. Zero average fields. 2. Correlation is completely neglected. A quasilinear approximation is considered for these equations. The work differs from earlier ones in that the nonlinear equations are considered not for plasmons but for complex field am-

ACCESSION NR: AP4042788

plitudes, from which equations are obtained for the real amplitudes and phases. This makes it possible to ascertain the conditions under which the assumption of rapid phase variation, assumed in earlier work, is valid. The effect of variation of the charged-particle distribution functions f_a on the spectrum is taken into account. It is shown that if the nonlinear interaction of three, four, and more waves is taken into account, there is no closed system of equations for the function f_a and for the second correlations (of the plasmons). In its place there is a closed system of equations for the function f_a and several correlation functions, the number of which depends on the number of interacting waves. Perturbation theory is not used with respect to the field. The small quantity used is the number of charged particles interacting with the fields. This ensures slow variation of the field. In this respect to approach is analogous to that used in nonlinear optics. If the quasilinear approximation is used, account is taken of the coherent interaction of the waves.

Card 2/3

ACCESSION NR: AP4042788

In the general case, the equations obtained describe both coherent and noncoherent interaction of the waves, and make it possible, in particular, to describe the appearance and development of the average field which is excited by a random field. Orig. art. has: 11 formulas. Report presented by N. N. Bogolyubov.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 05Mar64 ENCL: 00

SUB CODE: ME NR REF SOV: 007 OTHER: 000

Card 3/3

L 41650-65 EWT(1)

ACCESSION NR: AP5006324 S/0126/65/019/002/0161/0168

AUTHOR: Klimontovich, Yu. L.; Kukharenko, Yu. A.

TITLE: Quantum kinetic equation for a system of charged particles with regard to interaction of the particles with waves

SOURCE: Fizika metallov i metallovedeniye, v. 19, no. 2, 1965, 161-168

TOPIC TAGS: quantum kinetic equation, charged particle, particle interaction, quantum equation, kinetic equation

ABSTRACT: A quantum kinetic equation is derived which takes particle collisions [illegible] account as well as interaction of the particles with the cooperative oscilla- [illegible] system. The equation also takes the exchange [illegible] the par- [illegible] consideration, together with the variation in the spectrum of the waves [illegible] new equation contains additional members [illegible] not appear in similar equations previously [illegible] see Pines, [illegible] P., Phys. Rev., 1962, 125, [illegible] equations.

ASSOCIATION: Moskovskiy gosuniversitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED 19JUN64

Card 1/2

EWT(1)/EPF(n)-2/EWG(m)/EPA(w)-2

...near wave interaction in a plasma 21

...urnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 2, 1965,

...plasma wave interaction, nonequilibrium plasma, correlation function, spectral function, distribution function

ABSTRACT: This article is a continuation of earlier studies by the author (ZhETF ... DAN SSSR v. 144, 1962, ... and ... plasma in which the mean ... near interaction of the waves, ... the tensors that determine the ... the approach ... obtained for the random ... the variation in the spectrum. These ...

Card 1/2

ACCESSION NR: AP5006497

-ressions for the real amplitudes and phases. The stationary solution of the equa- ... relation functions is then considered in the case of two-, three-, and ... -wave interactions. The nonstationary equations for the correlation func- ... It is shown that the equation for the ... obtained only in the case of ... the ... equation is replaced by ... functions, the number of ... equations for the ... the nonlinear interaction ... waves, are ... has 4 formulas.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: ...Mar64 ENCL: 00 SUB CODE: ME

NO REF SOV: ... OTHER: 003

Card 2/2

L 15168-66 EWT(1)/T IJP(c)
ACC NR: AP6002422 SOURCE CODE: UR/0020/65/165/005/1052/1055

AUTHOR: Klimontovich, Yu. L.

38
B

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: Approximation of "free" and "bound" charges for a system of charged particles. Self-consistent equations for the second distribution functions

21,44,55

SOURCE: AN SSSR. Doklady, v. 165, no. 5, 1965, 1052-1055

TOPIC TAGS: particle physics, hydrogen plasma, particle interaction

ABSTRACT: The author examines equations which describe the approximation of both "bound" and "free" charges. A hydrogen plasma is studied for simplicity. Similar methods may be used for analyzing more general cases. The equations derived in this paper and the corresponding equations for interacting neutral particles are used for derivation of kinetic equations for "internal" degrees of freedom and also for solving various problems in the theory of nonlinear polarization. Orig. art. has: 17 formulas.

SUB CODE: 20/ SUBM DATE: 26Oct64/ ORIG REF: 005/ OTH REF: 002
Card 1/1
UDC: 533.9.01 + 536.758

L 22252-66 EWA(h)/EWT(1) IJP(c) AT

ACC NR: AP6010981 SOURCE CODE: UR/0056/66/050/003/0605/0612

AUTHOR: Klimontovich, Yu. L.; Pogorelova, E. V.

46
B

ORG: Moscow State University (Moskovskiy gosudarstvennyy universitet)

TITLE: Polarization of semiconductors with saturation taken into account (two band model)

21

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 50, 3, 1966, 605-612

TOPIC TAGS: band theory, forbidden band, semiconductor, density matrix, recombination time, relaxation time, absorption coefficient, semiconducting material, electromagnetic field

ABSTRACT: The polarization vector of a semiconductor in a strong electromagnetic field is calculated using the two-band model. Two relaxation times are introduced phenomenologically into the density matrix equation. The first of these can be related to the recombination time and the second, to polarization relaxation of the system. Polarization associated with interband transitions is calculated (intraband transitions are not taken into account). Analytic expressions for the absorption and dispersion coefficients are obtained by taking into account the strong electromagnetic field on the assumption that

Card 1/2

2

L 22252-66

ACC NR: AP6010981

1) the electron energies are uniformly distributed over the bands, and 2) by taking into account the parabolic shape of the band. Non-uniform distribution of electrons with respect to energy within the band results in an asymmetry of the absorption and dispersion curves. The calculations are performed in the first harmonic approximation of with respect to field strength E and in the zero approximation with respect to D (D is the population difference in the bands) and also by taking into account the second harmonic in D. The latter leads to deformation of the bands which corresponds to an increase in the width of the forbidden band. Only resonance terms are left in the formulas presented. [CS]

SUB CODE: 20/ SUBM DATE: 16Jun65/ ORIG REF: 006/ OTH REF: 002/

Card 2/2 mat

L 39819-66 EEC(k)-2/EWP(k)/EWT(1)/FBD/T IJP(c) WD

ACC NR: AP6024856 SOURCE CODE: UR/0056/66/0051/001/0003/0012

AUTHOR: Klimontovich, Yu. L.; Kuryatov, V. N.; Landa, P. S.

60 B

ORG: Moscow State University (Moskovskiy gosudarstvennyy universitet)

TITLE: Wave synchronization in a gas laser with a ring resonator

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 51, no. 1, 1966, 3-12

TOPIC TAGS: laser, ~~mode locking~~, laser theory, coherent light, wave mechanics

ABSTRACT: Mode locking of two opposite waves in a ring laser is studied in the case when frequency mismatch between them is possible. The zero and first harmonics of the density matrix elements are taken into account in the calculation of polarization. A formula for the mode locking region width is derived for single-mode operation by taking into account second-order terms with respect to the mirror reflection coefficient. Results of an experimental investigation of the dependence of the mode locking region width on the magnitude and phase of the reflection coefficient are presented. The reflection coefficient was changed by introducing an additional mirror. The dependence of mode locking band on the reflection coefficient agrees qualitatively with the results of the calculations. Orig. art. has: 39 formulas and 6 figures. [CS]

SUB CODE: 20/ SUBM DATE: 06Dec65/ ORIG REF: 005/ OTH REF: 002/ ATD PRESS: 5043

Card 1/1

ACC NR: AP7003214 SOURCE CODE: UR/0031/66/051/006/1722/1733

AUTHOR: Klimontovich, Yu. L.; Pogorelova, E. V.

ORG: Moscow State University (Moskovskiy gosudarstvennyy universitet)

TITLE: On the theory of optical excitation of semiconductors. Absorption and dispersion characteristics of single- and two-photonprocesses

SOURCE: Zh eksper i teor fiz, v. 51, no. 6, 1966, 1722-1733

TOPIC TAGS: laser theory, anomalous dispersion, optical pumping, semiconductor laser, single photon process, two photon process, photon, semiconductor research

ABSTRACT:

An investigation was made to obtain a theoretical account of 1) optical processes in which the semiconductor exhibits negative absorption (laser effect) and 2) bleaching phenomena in which the absorption vanishes (transparency effect). The simplified, two-band model was assumed for the semiconductor, and only band-to-band transitions were considered, intraband transitions being assumed negligible. A similar theory was developed previously by the authors [ZhETF, v. 50, no. 3, 1966, 605-612], taking into account two relaxation periods T_1, T_2, for the recombination of the electrons and the polarization of the medium. In the present work a third relaxation period, $T_3 << T_1, T_2$, is introduced relative to the deceleration of the

ACC NR: AP7003214

electrons in the bands. The present theory also involves the frequency ω at which dispersion is investigated. As in the previous paper, it was found that the saturation effect in the case of single-photon processes can be described by the first harmonic of polarization P and the constant term of the population difference D. Results are similarly described in terms of a characteristic energy shift Δ_g increasing with the pumping field E_1 and vanishing at $E_1 = 0$. It was shown that for $\omega_1 > \Delta/h$ (Δ = width of the forbidden gap), for single-photon processes, and for $\omega_1 > \Delta/2h$, for two-photon processes, the lower edge of the absorption band is shifted toward higher frequencies by about Δ_g/h. Negative absorption occurs for $\Delta < h\omega_1 < \Delta + \Delta_g$. The saturation field (beyond which Δ_g no longer increases and the absorption vanishes) is $E_s = h\omega_1 - \Delta$, for single-photon processes, and $E_s = 2h\omega_1 - \Delta$ for two-photon processes. Dispersion characteristics are also given. They take the form of the usual anomalous dispersion curve, with a maximum shifted toward higher frequencies like the lower edge of the absorption curve. Orig. art. has: 42 formulas and 2 figures. [WA-14]

SUB CODE: 20/ SUBM DATE: 19Apr66/ ORIG REF: 011/ OTH REF: 003

Card 2/2

KLIMONTOWICZ, Andrzej, inz.

Expansion coefficient in group wire switching. Prace Inst teletechn 5 no.3:65-87 '61.

1. Wydzielone Biuro Rozwojowe ZAUT T-2, Warszawa.

KLIMONTOWICZ, Andrzej, inz.

Determination of the congestion in two-stage incomplete link systems. Prace Inst. teletechn. 6 no.4:81-98 '62

1. Wydzielone Biuro Rozwojowe, Zaklady Wytworcze Urzadzen Teletechnicznych T-2, Warszawa.

KLIMOV, Anatolii, comp.

KLIMOV, Anatolii, comp. Ural, zemlia zolotaia; kniga pionerov i shkol'nikov Sverdlovskoi, Molotovskoi i Cheliabinskoi oblastei. [Sverdlovsk], Sverdlgiz, 1944. 211, (1) p.
WaU DLC: PZ65.K58

SO: LC, Soviet Geography, Part II, 1951, Unclassified

KRASOVITSKIY, N.; MAKSIMOV, A.; KLIMOV, A.; NITSBERG, D.

Directors of enterprises on business accounting and basic control. Den.i kred. 13 no.11:20-24 N '55. (MLRA 9:2)

1.Director zavoda "Vulkan" Leningrad (for Krasovitskiy).2.Zamestitel' direktora Uralmashzavoda (for Nitsberg).3.Zamestitel' direktora Novo-Kramatorskogo zavoda imeni Stalina (for Maksimov).4.Nachal'nik finansovogo otdela Avtozavoda imeni Molotova (for Klimov).
(Industrial management) (Banks and banking)

KLIMOV, A.

KLIMOV, A.

Successes are born in nation-wide socialist competition. Prom. koop. 12 no.1:3 Ja '58. (MIRA 11:1)

1. Predsedatel' Mosgorpromsoveta.
(Moscow--Cooperative societies)

KLIMOV, A. (Moskva)

On the path of specialisation and enlargement of artels. Prom. koop. 13 no.12:4-5 D '59. (MIRA 13:4)

1. Predsedatel' pravleniya Moskovskogo gorpromsoveta.
(Moscow--Manufactures)

SEROBABA, M., gornyy inzh.; BAYRACHNYY, A.; PAUPEROV, A.;
SHCHERBIY, P., zaboyshchik; KLIMOV, A.

When you work with ardor. Sov.shakht. 11 no.2:24-28 F '62. (MIRA 15:1)

1. Chlen shakhtnogo komiteta, predsedatel' proizvodstvennomassovoy komissii shakhty imeni Il'icha, Luganskoy oblasti (for Serobaba). 2. Zamestitel' predsedatelya prezidiuma postoyanno deystvuyushchego proizvodstvennogo soveshchaniya shakhty imeni Il'icha, Luganskoy oblasti (for Bayrachnyy). 3. Zamestitel' predsedatelya shakhtnogo komiteta, shakhty imeni Il'cha, Luganskoy oblasti (for Pauperov). 4. Predsedatel' zhilishchno-bytovoy komissii shakhty imeni Il'icha, Luganskoy oblasti (for Shcherbiy). 5. Sekretar' partiynoy organizatsii shakhty imeni Il'icha Luganskoy oblasti (for Klimov).
(Coal miners) (Trade unions)

LITVINOV, N., mayor, kand.voyennykh nauk; K IMOV, A., inzhener-kapitan.

Ascent altitude of a radioactive cloud. Av. i kosm. 47 no.6: 94-95 Je '64. (MIRA 17:7)

PA40T26

/Mathematics - Methods, Graphic May 1947
Mathematics - Equations, Quadratic

"Modification of Shvayger's Graphic Method for Determining Average Quadratic Quantities," A. A. Klimov, Candidate of Technical Sciences, Moscow, 1½ pp

"Elektrichestvo" No 5

Essentially this method leads to substitution of the load graph P = f(t) by right angles, so that the surplus as well as the deficient stages of the right-angle graph be equal to those of the curve graph. Method author describes for determination of average quadratic powers can also be used for determination of other average quadratic quantities, e.g., currents or

ID 40T26

/Mathematics - Methods, Graphic (Contd) May 1947

moments, if the given conforming load graphs are in the form: I = f(t) or M = f(t).

ID 40T26

KLIMOV, A. A.

KLIMOV, A.A., dotsent, kandidat tekhnicheskikh nauk.

Determining the heating temperature of an induction motor by means of a curvilinear diagram. Vest.elektroprom. 18 no.9:11-12 S '47. (MLRA 6:12)

1. Moskovskiy institut mekhanizatsii i elektrifikatsii sel'skogo khozyaystva im. V.M.Molotova.

(Electric motors, induction)

This form of a diagram is widely used in the study of electric and electromechanical prpperties of asynchronous electric motors and other electric apparat us utilizing alternating current. It can also be used to determine the heating condition of an electric motor . The author explains the formula and applies it to a spherical diagram. Also gives the value of for various types of electrical machinery in tabular form.

PROCESSES AND PROPERTIES INDEX

5A

BC4
C

621.313.333 : 621.316.717

[illegible]. Determination of the time of starting of an asynchronous short-circuited motor (cage rotor induction motor) with arbitrary loading on the shaft. [illegible], A. A. Elektrichestvo (No. 7) 73-74 (July, 1948) In Russian.—Explains a graphical construction, applied to the circle diagram, to find the starting time of a cage-rotor induction motor. E. W.

ASD-SLA METALLURGICAL LITERATURE CLASSIFICATION

KLIMOV, A. A. 428N/5

735.941

.k6

Velikiye stroyki kommunizma elektrifikatsiya sel'skogo khozyaystva Stalingradskoy oblast' (Great Constructions of communism and electrification of the rural economy of Stalingrad oblast) Stalingrad, Oblastnoye Knigoizdatel'stvo, 1952. 63 p. illus.

KLIMOV, A A

Elektrifikatsiya proizvodstvennykh protsessov v zhivotnovodstve (Electrifucation of production processes in animal husbandry) Moskva, Sel'khozgiz, 1955.

375p. illus., diagrs. (Uchebniki i uchebnyye posobiya dlya byashikh sel'skokhozyaystvennykh uchebnykh zavedeniy)

KLIMOV, A.A., kandidat tekhnicheskikh nauk.

Determining mechanical characteristics of electric motors and machines in operation. Sel'khozmashina no.2:17-18 F '57.
(Electric motors) (MLRA 10:4)

KLIMOV, A.A.

ANDRIANOV, V.N., doktor tekhn.nauk; BERSENEV, Ye.Ye., inzh.; BYSTRITSKIY, D.N., kand.tekhn.nauk; GREBENNIKOV, A.F., kand.tekhn.nauk; GRETSOV, N.A., kand.tekhn.nauk; ZUYEV, V.A., kand.tekhn.nauk; KLIMOV, A.A., kand.tekhn.nauk; KOROLEV, V.F., kand.tekhn.nauk; KUDRYAVTSEV, I.F., kand.tekhn.nauk; KULIK, M.Ye., kand.tekhn.nauk; NAZAROV, G.I., kand. tekhn.nauk; OLEYNIK, N.P., inzh.; OSETROV, P.A., kand.tekhn.nauk; PODSOSOV, A.N., inzh.; POPOV, S.T., inzh.; PRISHCHEP, L.G., kand. tekhn.nauk; PCHELKIN, Yu.N., inzh.; RUBTSOV, P.A., kand.tekhn.nauk; RUNOV, B.A., kand.tekhn.nauk; SAVINKOV, K.P., kand.tekhn.nauk; SAZONOV, N.A., prof., doktor tekhn.nauk; SERGEYEV, A.S., inzh.; SKVORTSOV, P.F., kand.tekhn.nauk; SMIRNOV, B.V., kand.tekhn.nauk; SMIRNOV, V.I., kand.tekhn.nauk; TYMINSKIY, Ye.V., inzh.; URVACHEV, P.N., kand.tekhn.nauk; SHTRURMAN, B.A., inzh.; SHCHUROV, S.V., kand.ekon.nauk; RUNOVA, L.M., inzh.; VOL'FOVSKAYA, D.N., red.; NIKITINA, V.M., red.; BALLOD, A.I., tekhn.red.

[Manual on the use of electric power in agriculture] Spravochnik po primeneniiu elektorenergii v sel'skom khoziaistve. Moskva, Gos. izd-vo sel'khoz. lit-ry, 1958. 606 p. (MIRA 11:5)
(Electricity in agriculture)

KLIMOV, A.A., kand.tekhn.nauk

Electric welding equipment in agriculture. Mekh. i elek. sots. sel'khoz. 16 no.4:40-43 '58. (MIRA 11:10)

1. Stalingradskiy sel'skokhozyaystvennyy institut.
(Electric welding)

KLIMOV, A.A., prof.

Use of electric arc discharge in agricultural technological processes. Mekh. i elek. sots. sel'khoz. 20 no.3:30-33 '62. (MIRA 15:7)

1. Volgogradskiy sel'akokhozyaystvennyy institut.
(Electricity in agriculture)
(Electric arc)

18(2,3) SOV128/59-5-20/35

AUTHOR: Astaulov, V.S., Klimov, A.D. and Astaulova, A.S., Engineers

TITLE: Refining the Structure and Eliminating Cracks in Magnesium Alloy Castings

PERIODICAL: Liteynoye Proizvodstvo, 1959, Nr 5, pp 33-34 (USSR)

ABSTRACT: Out of 300 tests made within the period of one year, the authors investigate the structure of alloys and elimination cracks from them. It becomes evident that when using 0,27% mamganese, the result is a fine grained structure without cracks in contrast to cracks and the formation of a dendrite structure when using less manganese, i.e. less than 0,2%. Fig. (1) and (2) show different kinds of grain of the structure. (a) fine grain, (b) coarse grain, (c) dendrite. Some dates are given with regard to the ratio of the structure to flux, modification, range of temperature for cristallyzation, etc. The authors state that there are some analoguous features to aluminium alloy. The range

Card 1/2

SOV/128-59-5-20/35

Refining the Structure and Eliminating Cracks in Magnesium Alloy Castings

of temperature for cristallyzation of some types of magnesium alloy is given and it is stated that extending the range of temperature improves the quality of the structure. There are 3 photographs.

Card 2/2

KLIMOV, A.D., kapitan 1-go ranga

Military and technical propaganda among students of naval schools. Mor. sbor. 48 no.12:27-30 D '64.

(MIRA 18:2)

KLIMOV, A.F.

PHASE I BOOK EXPLOITATION SOV/3559

Akademiya nauk SSSR. Institut metallurgii. Nauchnyy sovet po probleme zharoprochnykh splavov

Issledovaniya po zharoprochnym splavam, t. 5 (Investigations of Heat-Resistant Alloys, Vol 5) Moscow, Izd-vo AN SSSR, 1959. 423 p. Errata slip inserted. 2,000 copies printed.

Ed. of Publishing House: V.A. Klimov; Tech. Ed.: I.F. Kuz'min; Editorial Board: I.P. Bardin, Academician, G.V. Kurdyumov, Academician, N.V. Ageyev, Corresponding Member, USSR Academy of Sciences (Resp. Ed.), I.A. Oding, I.M. Pavlov, and I.F. Zudin, Candidate of Technical Sciences.

PURPOSE: This book is intended for metallurgical engineers, research workers in metallurgy, and may also be of interest to students of advanced courses in metallurgy.

COVERAGE: This book, consisting of a number of papers, deals with the properties of heat-resisting metals and alloys. Each of the papers is devoted to the study of the factors which affect the properties and behavior of metals. The effects of various elements such as Cr, Mo, and W on the heat-resisting properties of various alloys are studied. Deformability and workability of certain metals as related to the thermal conditions are the object of another study described. The problems of hydrogen embrittlement, diffusion and the deposition of ceramic coatings on metal surfaces by means of electrophoresis are examined. One paper describes the apparatus and methods used for growing monocrystals of metals. Boron-base metals are critically examined and evaluated. Results are given of studies of interatomic bonds and the behavior of atoms in metal. Tests of turbine and compressor blades are described. No personalities are mentioned. References accompany most of the articles.

1/5

BYCHKOV, Yu.F.; KLIMOV, A.F.; ROZANOV, A.N.; SKOROV, D.M.

Effect of alloying on the longitudinal elasticity modulus of zirconium. Met.i metalloved.chist.met. no.1:231-242 '59. (MIRA 12:10)

(Zirconium alloys) (Elasticity)

5(4) SOV/54-59-2-19/24

AUTHORS: Parfenov, A. I., Klimov, A. F., Mazurin, O. V.

TITLE: Electric Conductivity of the Glasses of the System Li_2O-Cs_2O-SiO_2 (Elektroprovodnost' stekol sistemy Li_2O-Cs_2O-SiO_2)

PERIODICAL: Vestnik Leningradskogo universiteta. Seriya fiziki i khimii, 1959, Nr 2, pp 129-135 (USSR)

ABSTRACT: The results of the investigations of the conductivity and density of glasses of the system mentioned in the title are indicated in this article. The mentioned system is used as a basis for the working out of formulas for electrode glasses. These glasses have at present a resistance of 500 MΩ. The working method with them is much simplified if these glasses have a lower resistance. Under this point of view, the investigations described in this article were carried out. The designations of the glasses produced and investigated for the experiments, and their composition, are compiled in table 1. An analysis carried out on the glasses showed a deviation of some percent in the composition as compared with the quantities of single components used for the preparation. The density was determined by hydrostatic weighing of the samples in water and

Card 1/3

Electric Conductivity of the Glasses of the System $Li_2O-Cs_2O-SiO_2$ SOV/54-59-2-19/24

benzene at room temperature (error ±0.1 - 0.2 %). The conductivity was determined on plane-parallel samples by graphite electrodes, the resistance of the glasses up to $10^6\Omega$ by a bridge circuit, higher resistances by a megaohmmeter of the MOM-ZM type (error 20 - 30 %). The values of the mentioned determination quantities are compiled in table 2. The table also contains the activation energy E for the movement of ions in kcal/Mol and lg A computed by the formula for electric conductivity $\varkappa = Ae^{E/kT}$. From the density of the glasses, their molecular volume was computed, and - as the Cs-glasses have the highest density - the dependence of the molar volume on the concentration of Cs_2O was determined at a constant content of Li_2O (Fig 1, and content of Cs_2O+Li_2O = const. = =27 mol% Fig 2). For investigating the conductivity of glasses of different composition, the neutralization effect was investigated which occurs by replacing one basic oxide by another (Fig 3). This points to a direct dependence between the differences of radii of the basic ions entering into the system, and the character of the neutralization effect.

Card 2/3

Electric Conductivity of the Glasses of the System Li_2O-Cs_2O-SiO_2 SOV/54-59-2-19/24

In the investigation of the activation energy at the transition from sodium-potassium-silicate glasses to the system considered, no influence of the ion radius on its value could be observed (Fig 6). From all these investigations, the following conclusions are made: The electric conductivity of lithium glasses decreases considerably with an increase in the content of Cs_2O. For electrodes, which are only used at low temperatures, glasses with a low content of Cs_2O (up to 6 Mol%) should be preferred. With an increase in the content of Cs_2O, the toughness and also the melting temperature for glasses rise so that for electrodes used at higher temperatures an increase in the content of Cs_2O up to 9 Mol% is permissible. Glasses with a higher content of Cs_2O are unsuitable for use as electrodes due to their high resistance. There are 6 figures, 3 tables, and 4 references, 3 of which are Soviet.

SUBMITTED: October 28, 1958

Card 3/3

KLIMOV, Arkadiy Frolovich [Klimau, A.F.]; UKSUSOV, D. [Uksusau, D.], red.; SLAVYANIN, I., tekhn. red.

[Words anddeeds] Slova i spravy. Minsk, Dziarzh. vyd-va BSSR. Red. massva-palit. lit-ry, 1960. 35 p. (MIRA 14:10)

1. Sekretar' Sennenskogo rayonnogo komiteta Kommunisticheskoy partii Belorussii (for Klimov).
(Senno District—Swine—Feeding and feeds)

BER, B.A.; KLIMOV, A.G.; LYUDSKOV, B.P. redaktor; ROSLOV, G.I., tekhnicheskiy redaktor.

[Installation, repair and operation of refrigeration equipment] Montazh, remont i ekspluatatsiia kholodil'nogo oborudovaniia. Moskva, Gos. izd-vo torgovoi lit-ry, 1955. 280 p. (MLRA 8:8)
(Refrigeration and refrigerating machinery)

BER, Boris Arkad'yevich; KLIMOV, Aleksey Georgiyevich; SINEL'NIKOVA, Ts.B., red.; MEDRISH, D.M., tekhn.red.

[From refrigerating machinery] Freonovye kholodil'nye ustanovki. Moskva, Gos.izd-vo torg.lit-ry, 1957. 183 p. (MIRA 10:12)
(Refrigeration and refrigerating machinery)

KLIMOV, A.G., elektromekhanik

How we install control locks. Avtom., telem. i sviaz' 2 no.11:39 N '58. (MIRA 11:12)

1. Leningrad-Varshavskaya distantsiya signalizatsii svyazi Oktyabrskoy dorogi.

(Railroads—Switches)

L 21187-66 EWT(m)/EWP(t)/ IJP(c) JD/JW

ACC NR: AP6009823 SOURCE CODE: UR/0413/66/000/004/0016/0016

INVENTOR: Klimov, A. G.; Zotov, B. G.; Gaydenko, A. A.; Argunova, V. I.

28 B

ORG: none

TITLE: Preparation of hydrofluoric acid. Class 12, No. 178796

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 4, 1966, 16

TOPIC TAGS: chemical decomposition, fluorite, hydrofluoric acid, acid decomposition

ABSTRACT: This Author Certificate introduces a method of preparation of hydrofluoric acid by decomposition of fluorite. An increased recovery is achieved by decomposing fluorite concentrate with orthophosphoric acid at 250C. [JK]

SUB CODE: 07/ SUBM DATE: 24Mar65/ ATD PRESS: 4222

Card 1/1 BK UDC: 546.161.07

KLIMOV, A.I.

CA

8

X-ray analyses of wolframite crystals. S. M. Ruban, A. I. Klimov and M. M. Umanskii. *J. Phys. Chem. (U.S.S.R.)* 14, 841-3(1940).—The values obtained, a : b : c = 0.836 : 1 : 0.870 confirm those previously obtained by Broch (*C. A.* 20, 1579). F. H. Rathmann

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

KLIMOV, A. I.

Agriculture

Local water resources and their exploitation by collective farms of the Smolensk province; Smolensk, Smolenskoe obl. gos. izd-vo, 1950.

9. Monthly List of Russian Accessions, Library of Congress, May 1952, Uncl.

KLIMOV, A.I.

Improved determination of bounds for zeros of *L*-functions. Ukr.mat.zhur. 5 no.2:171-184 '53. (MLRA 6:6)

(Series, Dirichlet's)

KLIMOV, A. I. 11 Mar 53

USSR/Mathematics - Dirichlet Function

"Evaluation of the Limit of Zeros of L-Functions," A. I. Klimov, Saratov State Pedagog Inst

DAN SSSR, Vol 89, No 2, pp 205-208

Obtains new evaluation of limit of zeros of Dirichlet's L-functions. Indicates in the formula giving the limit of zeros, the dependence of the function on modulus k of character x(n,k) and computes the consts entering in to the formula. Presented by Acad I. M. Vinogradov. Recd 23 Dec 52.

Source #264T86