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L 9228-66 EWT(1)/EWT(m)/ETC/EPF(n)-2/EWG(m)/EWP(t)/EWP(b)/FTC(m) IJP(c)

ACC NR: AP5026103 JD/WW/AT SOURCE CODE: UR/0386/65/002/005/0238/0241

AUTHOR: Zagorodnikov, S. P.; Rudakov, L. I.; Smolkin, G. Ye.; Sholin, G. V.

ORG: none

TITLE: Investigation of the structure of the front of a strong magnetic-sound wave in a rarefied plasma

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 2, no. 5, 1965, 238-241, and insert, side A, between p. 238 and 239

TOPIC TAGS: plasma wave propagation, rarefied plasma, helium plasma, magnetohydrodynamics, sound wave

ABSTRACT: The article is devoted to an experimental investigation of the structure of the front of a strong magnetic-sound wave propagating in a rarefied plasma transverse to a magnetic field. The experiments were carried out under the conditions described in an earlier paper by the authors (ZhETF v. 47, 1717, 1964). The wave was excited by a trapezoidal pulsed magnetic field H, produced on the boundary of a cylindrical plasma column (diameter 6 cm and length 30 cm) in a constant magnetic field H_0. The pulse growth time was $\tau_0 = 5.5 \times 10^{-8}$ sec. The plasma density n_0, ahead of the wave front ranged from $\sim 0.5 \times 10^{12}$ to $\sim 6 \times 10^{13}$ cm^{-3}. The magnetic Mach number μ varied in the range ~1.3--4.2. The following results were obtained. Nonlinear twisting of the wave front in the plasma was observed for all the indicated values of μ. The profile of the magnetic field in the plasma was in good agreement

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with the profile calculated by J. H. Adlam and J. E. Allen (Pros. Phys. Soc. (London) v. 75, 640, 1960) within the accuracy of the cylindrical effect. The width of the transition region coincides, with ~50% accuracy (taking nonstationarity into account), with the width calculated by Adlam and Allen. Oscillograms of the magnetic-probe signals show that the front of the magnetic field, which increases linearly on the plasma boundary, changes inside the plasma into an exponentially growing front with a gradually increasing slope. The absorption of the wave energy on the front increases with increasing n_0. At the same time, electrons with energy larger than 50 ev appeared behind the wave front. The energy transfer from the wave to the plasma electrons is attributed either to instability or ionization collisions of the electrons on the wave front. Authors are grateful to Ye. K. Zavoyskiy for interest in the work and to A. A. Vedenov and Ye. P. Velikhov for valuable discussions. Orig. art. has: 3 figures and 2 formulas.

SUB CODE: 20/ SUBM DATE: 17Jul65/ ORIG REF: 003/ OTH REF: 007

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, L. I. and SAGDEEV, R. Z.

"High Frequency Heating of Plasma." (Work carried out in 1956); pp. 153-164.

"The Physics of Plasmas; Problems of Controlled Thermonuclear Reactions:" Vol. III. 1958, published by Inst. Atomic Energy, Acad. Sci. USSR.
resp. ed. M. A. Leontovich, edotorial work V. I. Kogan.

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, L. I. and SAGDEEV, R. Z.

"A Quasi-Hydrodynamic Description of a Dilute Plasma in a Magnetic Field." (Work carried out in 1957); pp. 268-277.

"The Physics of Plasma; Problems of Controlled Thermonuclear Reactions." Vol. III. 1958, published by Inst. Atomic Energy, Acad. Sci. USSR. resp. ed. M. A. Leontovich, editorial work V. I. Kogan.

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, L. I. and SAGDEEV, R. Z.

"Investigation of the Stability of a Cylindrical Plasma Column by Methods of Kinetic Equations." (Work carried out in 1958); pp. 54-60.

"The Physics of Plasmas; Problems of Controlled Thermonuclear Reactions." Vol. IV. 1958, published by Inst. Atomic Energy, Acad. Sci. USSR.
resp. ed. M. A. Leontovich, editorial work V. I. Kogan.

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

VEDENOV, A. A. and RUDAKOV, L. I.

"The Motion of a Charged Particle in the Rapidly Alternating Electro-Magnetic Fields." (Work carried out in 1958); pp. 43-48.

"The Physics of Plasmas; Problems of Controlled Thermonuclear Reactions." Vol. IV. 1958, published by Inst. Atomic Energy, Acad. Sci. USSR. resp. ed. M. A. Leontovich, editorial work V. I. Kogan.

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

OSOVETS, S. M., SAGDEYEV, R. Z., TRUBNIKOV, B. A., SHAFRANOV, V. D., VOLKOV, T. F.
RUDAKOV, L. I.

"Interaction Between Alternating Electromagnetic Fields and High-Temperature Plasma."

paper to be presented at 2nd UN Intl. Conf. on the peaceful uses of Atomic Energy, Geneva, 1 - 13 Sep 58.

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21(0) PHASE I BOOK EXPLOITATION SOV/2081

International Conference on the Peaceful Uses of Atomic Energy, 2d., Geneva, 1958

Doklady sovetskikh uchenykh; yadernaya fizika (Reports of Soviet Scientists; Nuclear Physics) Moscow, Atomizdat, 1959. 552 p. (Series: Its: Trudy, Vol. 1) 8,000 copies printed.

Eds. (Title page): A.I. Alikhanov, Academician; V.I. Veksler, Academician; and N.A. Vlasov, Candidate of Physical and Mathematical Sciences; Ed. of this volume: S.I. Drozdov and D.F. Zaretskiy, Candidates of Physical and Mathematical Sciences; Ed. (Inside book): G.L. Smolyan; Tech. Ed.: Ye.I. Mazel'.

PURPOSE: This collection of articles is intended for scientific research workers and other persons interested in nuclear physics. The volume contains 43 papers presented by Soviet Scientists at the Second Conference on Peaceful Uses of Atomic Energy, held in Geneva in September 1958.

COVERAGE: It is divided into two parts. Part I contains 17 papers dealing with plasma physics and controlled thermonuclear reactions, and Part II contains 26 papers on nuclear physics, including problems of particle acceleration and of cosmic ray physics. The first paper by L.A. Artsimovich presents a review of Soviet work on controlled thermonuclear reactions. The remaining papers in Part I deal with particular problems in this field.

papers in Part II deal in detail with various problems in nuclear physics, such as the fission of heavy atoms and their isotopes, and with the study of cosmic radiation by means of artificial earth satellites and rockets, described in a paper by S.N. Vernov. The Russian-language edition of the proceedings of the conference is published in 16 volumes. The first 6 volumes contain all the papers presented by Soviet scientists as follows: Volume (1), Yadernaya fizika (Nuclear Physics); Volume (2), Yadernyye reaktory i yadernaya energetika (Nuclear Reactor and Nuclear Power); Volume (3), Yadernoye goryuchego metally (Nuclear Fuel and Reactor Metals), Volume (4), Khimiya radioelementov i radiatsionnykh prevrashcheniy (Chemistry of Radioelements and of Radiation Transformations); Volume 5, Radiobiologiya i radiatsionnaya meditsina (Radiobiology and Radiation Medicine); Volume (6) Polucheniye i primeneniye izotopov (Production and Use of Isotopes). The other 10 volumes contain selected papers presented at the Conference by non-Soviet scientists. In the present volume discrepancies between the English and Russian language editions of the proceedings have been noted in three articles where the texts are not identical; viz; Andrianov, et al, "High Current Pulsed Discharge"; Akhiyezer, et al, "High Frequency Plasma Oscillation"; and Bogolyubov, "Investigations of the Many-body Problem". The serial numbers of reports 2502 and 2504 are reversed in the English edition. Report 2211, by Simelnikov, et al, is numbered 2536 in the English edition.

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, L.I.

[Magnetic trap with rotating mirrors] Magnitnaia lovushka s vrashchaiushchimisia probkami. Moskva, In-t atomnoi energii, 1960. 9 p. (MIRA 17:1)

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10.2000 (A)

S/057/60/030/008/004/019
B019/B060

AUTHOR: Rudakov, L. I.

82483

TITLE: A Magnetic Trap With Rotating Plugs

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1960, Vol. 30, No. 8, pp. 907 - 912

TEXT: The author studies the way of retaining plasma particles in a trap with magnetic plugs by means of forces acting in a plasma, if the latter features an electromagnetic high-amplitude oscillation. When, under the action of a magnetic field constant with time and a high frequency electric field perpendicular to the former, a charged particle gains a velocity changing its direction, a centrifugal force acts upon the particle. The particle then moves along the lines of force in the $\vec{H}$-direction. This effect is similar to the one in a rotating plasma. In the first section of the present paper the author studies the motion of charged particles in a time-constant, spatially variable magnetic field and a time-varying electromagnetic field. Equations (4) and (5) are derived for the determination of longitudinal and transverse components

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A Magnetic Trap With Rotating Plugs

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of velocity of particles. These equations are discussed, and the mode of retaining the plasma particles is studied with the preceding results in the second section. The approximate formula (10) is derived for the electron and ion density in a trap in a field of circularly polarized traveling waves, and formula (16) is obtained for the maximum kinetic energy of particles in parallel to the constant magnetic field. A generalization for the case of elliptically polarized waves raises no difficulties. The author gives the condition, under which the results obtained for traveling waves are likewise valid for standing waves, and shows that a consideration of collisions entails the occurrence of particles, whose maximum energy in the direction of the magnetic field is larger than the one determined by (16). Moreover, he points out that no wave effects are treated in the present paper. On the strength of results obtained, the retaining of plasma in a trap with magnetic plugs with elliptically polarized electromagnetic oscillations (circularly polarized oscillations in the case under discussion) is possible if $H_{\sim 0}^2/8\pi > nT$ ($H_{\sim 0}$ is the amount of the magnetic vector of the traveling wave, T is the absolute temperature, n is the density of electrons and ions). The author

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A Magnetic Trap With Rotating Plugs

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finally thanks D. A. Frank-Kamenetskiy, V. D. Rusanov, and V. Demidov for their discussions. There are 5 Soviet references.

SUBMITTED: April 9, 1960

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, L. I.

Cand Phys-Math Sci - (diss) "Kinetics of non-uniform plasma in strong magnetic fields." Moscow, 1961. 9 pp; (Physics Inst imeni P. N.Lebedev Academy of Sciences USSR); 150 copies; price not given; (KL, 10-61 sup, 205)

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S/020/61/138/003/012/017
B104/B205

24.2120

AUTHORS: Rudakov, L. I. and Sagdeyev, R. Z.

TITLE: Instability of an inhomogeneous rarefied plasma in a strong magnetic field

PERIODICAL: Doklady Akademii nauk SSSR, v. 138, no. 3, 1961, 581 - 583

TEXT: The mechanism of plasmatic instabilities which are not due to fluctuations of temperature has been studied on the following assumptions: 1) The pressure of the plasma is low as compared to the magnetic pressure: $p \gg H^2/8\pi$ [Abstracter's note: Obviously a misprint]; 2) instabilities occur after a period of time that is smaller than the collision time; 3) the frequency of build-up oscillations is considerably lower than the ion cyclotron frequency: $\omega \ll eH/Mc$; the wavelength, λ, of perturbations is much larger than the Larmor radius of ions, $\lambda \gg r_H$; 4) $H^2/8\pi \ll nMc^2$. It is further assumed that the magnetic field $\vec{H}$ is every where parallel to the z-axis, and that the quantity characterizing the steady state of the plasma varies in the direction of the x-axis. Slight perturbations of

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the steady state, having the form $A(x)\exp i(k_z z + k_y y - \omega t)$, are described next. The correction for the distribution functions of electrons and ions, obtained from the solutions of the linearized equations of motion of electrons and ions, reads

$$f_\alpha = -i\left(\frac{e_\alpha}{m_\alpha} E_z \frac{\partial f_{0\alpha}}{\partial v_z} + c\frac{E_y}{H_0}\frac{\partial f_{0\alpha}}{\partial x}\right)\frac{1}{\omega - k_z v_z}; \qquad (1)$$

α = i, e (ions and electrons, respectively) holds for the subscript α; f_0 is the unperturbed distribution function. The assumption made under 3) is used here. It is shown that, if only frequencies smaller than the Larmor frequency are considered, it follows that only those perturbations can be taken into account, which are propagated with phase velocities much lower than the Alfvèn velocities. Based on these results, the perturbations of the scalar potential φ are given by

$$\frac{d^2\varphi}{dx^2} - F(\omega, k, x)\varphi = 0, \qquad (5)$$

where

$$F(\omega, k, x) = \frac{\omega_H^2}{\omega} k_z^2 \int \frac{v_z dv_z}{\omega - k_z v_z}\left\{\left[\frac{M}{m}\frac{\partial f_{0e}}{\partial v_z} + \frac{\partial f_{0i}}{\partial v_z}\right] + \frac{k_y}{k_z}\frac{1}{\omega_H}\frac{\partial}{\partial x}(f_{0i} - f_{0e})\right\}$$

$$\left(\omega_H = \frac{eH}{Mc}\right).$$

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For a homogeneous plasma, Eq. (5) leads to the well-known dispersion relation of "ion sound" oscillations:

$$\int \frac{v_z dv_z}{\omega - k_z v_z}\left[\frac{M}{m}\frac{\partial f_{0e}}{\partial v_z} + \frac{\partial f_{0i}}{\partial v_z}\right] = 0. \qquad (A)$$

In an inhomogeneous plasma, the solutions to Eq. (5) must be sought for a φ which decreases toward both sides ($x \to \pm\infty$). The eigenvalues ω are determined by Eq. (5) together with this requirement. Solutions of this type are local solutions near the point x, where $F(\omega, k, x) = 0$ (6). In the neighborhood of x, Eq. (5) has the form of an Ayri equation with a complex argument. The application of the results obtained above to a case where the particles have a Maxwellian velocity distribution leads to the following conclusions: If $n(x) = \text{const}$ and $T(x) \neq \text{const}$, the equation

$$\omega^3 + \frac{k_y}{k_z}\frac{d\ln T}{dx} k_z^3 \frac{2T^2}{M^2\omega_H} = 0. \qquad (7)$$

will exist for the interval $\sqrt{T/M} \ll \omega/k \ll \sqrt{T/m}$, provided $\frac{k_y^2}{k_z^2}\left(\frac{d\ln T}{dx}\right)^2 r_H^2 \gg 1$. There are always roots of this equation that yield

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Instability of an inhomogeneous... S/020/61/138/003/012/017
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instabilities. The above-mentioned limitation for ω/k is equivalent to a hydrodynamic approximation, for which $\gamma = c_p/c_v \sim 1$ is assumed. Furthermore, Eq. (7) does not utilize all roots of the dispersion relation (6). If $T(x) = \text{const}$ and $n(x) \neq \text{const}$, (6) will have complex roots that correspond to an attenuation of oscillations (the plasma is stable). Academician M. A. Leontovich is thanked for valuable advice and comments. There are 5 references: 1 Soviet-bloc and 4 non-Soviet-bloc.

PRESENTED: January 28, 1961, by M. A. Leontovich, Academician

SUBMITTED: December 27, 1960

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

BABYKIN, M.V.; GAVRIN, P.P.; ZAVOYSKIY, Ye.K.; RUDAKOV, L.I.; SKORYUPIN, V.A.

Turbulent heating of a plasma. Zhur. eksp. i teor. fiz. 43 no.2: 411-421 Ag '62. (MIRA 16:6)
(Plasma (Ionized gases)) (Electromagnetic waves)

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BABYKIN, M.V.; GAVRIN, P.P.; ZAVOYSKIY, Ye.K.; RUDAKOV, L.I.; SKORYUPIN, V.A.

Capture and confinement of a turbulent heated plasma in a magnetic trap. Zhur. eksp. i teor. fiz. 43 no.4:1547-1549 O '62. (MIRA 15:11)

(Plasma (Ionized gases))
(Magnetic fields)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

43382
S/056/62/043/005/053/058
B125/B104

AUTHORS: Babykin, M. V., Zavoyskiy, Ye. K., Rudakov, L. I., Skoryupin, V. A.

TITLE: The observation of a two-flow ion instability in the case of turbulent plasma heating

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 5(11), 1962, 1976-1978

TEXT: The method of turbulent heating of the electrons was used for observing the abnormal scattering of plasma beams (produced by two titanium guns). The experimental arrangement was described by M.V.Babykin et al. (ZhETF, 43, 1547, 1962). Two plasma beams (density $2 \cdot 10^{13}$ to $5 \cdot 10^{13}$ cm^{-3}) travelled in opposite direction inside a quartz tube of 3.6 cm diameter in a homogeneous magnetic field (600 oe) at the maximum speed of $1.4 \cdot 10^{7}$ cm/sec, interpenetrating within an oscillatory circuit which served for the turbulent electron heating. Throughout the entire space between the guns the electrons were heated to 300-400 ev during 0.2 μsec. The mean

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free path of the hydrogen ions with respect to the Coulomb scattering through the angle $\pi/2$ is found to be several meters. The temperature of the plasma flow emerging from the guns, as measured using a special probe, did not exceed 5 ev, whilst the kinetic energy of the translatory motion of the beam protons reached 100 ev. Such ion temperatures are reached also when two beams collide. As the density of the beam increases, the temperature measured with the probe increased slightly to 10 ev, due to the Coulomb scattering of the ions. The signals recorded by the probe correspond to maximum ion temperatures of 50 ev. The ion temperature decreases at first rapidly and then more slowly as the response of the circuit to the operation of the guns becomes attenuated. The strong mutual scattering of the plasma beams occurs only at high temperatures of the plasma electrons and cannot be explained by Coulomb collisions. Possibly it is due to the scattering of ions from electric microfields which occur within the plasma owing to the instability of the two-flow motion of the ions. There are 2 figures.

SUBMITTED: July 16, 1962

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Pz-4/Pi-4/Po-4 AT S/056/63/044/003/023/053

74

AUTHOR: Mikhaylovkiy, A. B. and Rudakov, L. I.

TITLE: Stability of a spatially inhomogeneous plasma in a magnetic field

PERIODICAL: Zhurnal eksperimental'noy i tekhnicheskoy fiziki, v. 44, no. 3, 1963, 912-918

TEXT: There exist two groups of possible approaches to the questions connected with the stability of the plasma. One can investigate either the time development of initial perturbations, or one can search for the (generally complex) frequencies of self-oscillations. The authors investigated the stability and the oscillations of the plasma in a magnetic field assuming that the pertubed quantities vary slowly in the direction of plasma inhomogeneity. Consequently, they neglected small terms containing the space derivatives and obtained algebraic equations which yielded the frequency as function of coordinates. However, they did not assume the ion Larmor radius small relative to the wave length. The analysis is carried out for the particular case of small pressure infinite plasma layer in a homogeneous magnetic field (the problem is of importance for the magnetic isolation of the

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Stability of spacially inhomogeneous plasma...

plasma). The kinetic equation is used and collisions are neglected. It is shown that in a plasma with an inhomogeneous density and temperature, perturbations exist which are unstable for infinitesimal inhomogeneities and arbitrary relative values of the density and temperature gradients (in this sense the instability is universal). Perturbations, with a wave length along the magnetic field larger than the characteristic length of density or temperature change a, turn out to be unstable. The transverse wave length of the most unstable perturbations disturbances is of the order or smaller thant the ion Larmor radius. Ion-acoustic and Alfven oscillations which move in a direction almost perpendicular to the magnetic field correspond to such disturbances in a homogeneous plasma. The maximum increment of the instability is $(T_i/Ma^2)^{\frac{1}{2}}$ (M = ion mass). There are 4 figures.

SUBMITTED: June 9, 1962
November 14, 1962 (supplement added)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

GALEYEV, A.A.; RUDAKOV, L.I.

Nonlinear theory of the drift instability of an inhomogeneous plasma in a magnetic field. Zhur. eksp. i teor. fiz. 45 no.3: 647-655 S '63. (MIRA 16:10)

1. Novosibirskiy gosudarstvennyy universitet.
(Plasma (Ionized gases)) (Magnetic fields)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

ACCESSION NR: AP4019216 S/0056/64/046/002/0511/0530

AUTHORS: Baby*kin, M. V.; Gavrin, P. P.; Zavoyskiy, Ye. K.; Rudakov, L. I.; Skoryupin, V. A.; Sholin, G. V.

TITLE: New results on the turbulent heating of plasma

SOURCE: Zhurnal eksper. i teor. fiz., v. 46, no. 2, 1964, 511-530

TOPIC TAGS: plasma, plasma heating, turbulent plasma, heating, plasma electron heating, plasma ion heating, collisionless plasma heating, plasma confinement, plasma confinement time, electron confinement time, ion confinement time

ABSTRACT: This is a continuation of earlier work by the same authors on turbulent plasma heating in a rapidly alternating magnetic field (Yaderny*y sintez, Appendix III, 1962; ZhETF, v. 43, pp. 411, 1547, and 1976, 1962). The present paper reports the results of experiments with a net setup, the parameters of which have made possible (1) rapid collisionless heating of the plasma electrons to 1.5 keV by a strong hydrodynamic wave propagating in the plasma transversely

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through the magnetic field; (2) investigations of the confinement of a plasma in a magnetic trap; (3) observations of the collisionless heating of ions, which accompanies the turbulent heating of the electrons under certain conditions. The electron temperature was determined from the absorption of the electron bremsstrahlung in thin carbon films, from the ratio of the rates of decay of various spectral lines, and from readings of a probe. The plasma concentration was determined by optical means. The noise produced in the plasma was due to ion cyclotron oscillations and to magnetic sound resonance. A plasma electron pressure of 10^{15} eV/cm^3 (approximately 20% of the alternating magnetic field pressure) was obtained in the concentration range from 10^{12} to 10^{13}/cm^3. Confinement times were ~130 μsec for ~100-eV ions and ~60 μsec for 500-eV electrons. No strong instabilities were observed during the time of plasma confinement in the trap. Ion cyclotron waves and natural oscillations of the plasma column were

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ACCESSION NR: AP4019216

observed. A theoretical mechanism is proposed for this electron heating and is found to agree qualitatively with experimental results. Orig. art. has: 17 figures and 10 formulas.

ASSOCIATION: None

SUBMITTED: 13Aug63 DATE ACQ: 27Mar64 ENCL: 01

SUB CODE: PH NO REF SOV: 008 OTHER: 002

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APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

DIAKOV, V.M.; KULAKOV, M.I.; RYUTOV, D.D.

Interaction of waves with negative energy in a weakly turbulent plasma. Zhur. eksp. i teor. fiz. 48 no.3:913-920 Mr '65. (MIRA 18:6)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

BABYKIN, M.A.; GAVRIN, P.P.; ZAVOYSKIY, Ye.K.; MUHAKOV, L.I.; SKOBELYUPIN, V.A.

Turbulent heating of a plasma in a straight discharge. Zhur. eksp. i teor. fiz. 47 no.4:1597-1600 O '64. (MIRA 18:1)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

L 19045-65 EWT(1)/EWG(k)/EPA(sp)-2/EPA(w)-2/EEC(t)/T/EEC(b)-2/EWA(m)-2 Po-4/Pi-4/Pz-6/Pab-10 AEDC(b)/AFETR/ASD(p)-3/RAEM(a)/SSD(b)/AFWL/ESD(gs)/IJP(c) AT
ACCESSION NR: AP5000307 S/0056/64/047/005/1631/1643

AUTHOR: Baby*kin, M. V.; Gavrin, P. P.; Zavoyskiy, Ye. K.; Rudakov, L. I.; Skoryupin, V. A.

TITLE: Stability of a turbulently heated plasma during adiabatic compression

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, no. 5, 1964, 1631-1643

TOPIC TAGS: plasma confinement, plasma diffusion, bremsstrahlung, adiabatic trap, plasma trapping, plasma heating

ABSTRACT: This is a continuation of a series of earlier investigations by the authors (1961 Salzburg Conference, paper No. 209; ZhETF v. 43, 411, 1547, 1976, 1962 and v. 46, 511, 1964). The present paper reports on experiments on adiabatic compression of turbulently heated plasma and investigations of its stability, diffusion

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ACCESSION NR: AP5000307

transversely to the magnetic field, and bremsstrahlung. The experimental setup is illustrated in Fig. 1 of the enclosure. The maximum compression magnetic field was 9 kOe, with a half-cycle duration 2.5 msec. The results have led to the following conclusions: 1. Turbulent heating together with adiabatic compression is an effective means of obtaining a dense high-temperature plasma with relatively low coefficients of magnetic compression. 2. This plasma was fully stable in a mirror trap for ~2 msec. The hot plasma occupied the volume of a cylinder coaxial with the magnetic field of the trap. The stability is due to the presence of cold plasma, and the amount of cold plasma obtained by ionization of the residual neutral gas by fast electrons is sufficient for the stabilization. 3. The upper limit of the velocity of hydrogen plasma transverse to the magnetic field, determined by the measurement accuracy, is 2 m/sec at $T_e \approx 10$ keV and $n \approx 2 \times 10^{13}$ cm^{-3}. The electron temperature, determined from the bremsstrahlung radiated from the volume of the plasma is ~30 keV at the density of ~2×10^{13} cm^{-3}. "The

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ACCESSION NR: AP5000307

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authors thank L. V. Groshev, A. M. Demidov, G. V. Sholin, L. V. Korablev, A. V. Gordeyev, and D. D. Ryutov for useful advice and V. K. Voytovetskiy for providing a scintillator to register the bremsstrahlung. The authors thank also A. I. Gorlanov for help in preparing and carrying out the experiments." Orig. art. has: 9 figures and 3 formulas.

ASSOCIATION: none

SUBMITTED: 24Apr64 ENCL: 01 SUB CODE: ME

NO REF SOV: 007 OTHER: 001 ATD PRESS: 3157

Card 3/4

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

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ACCESSION NR: AP5000307

ENCLOSURE: 01

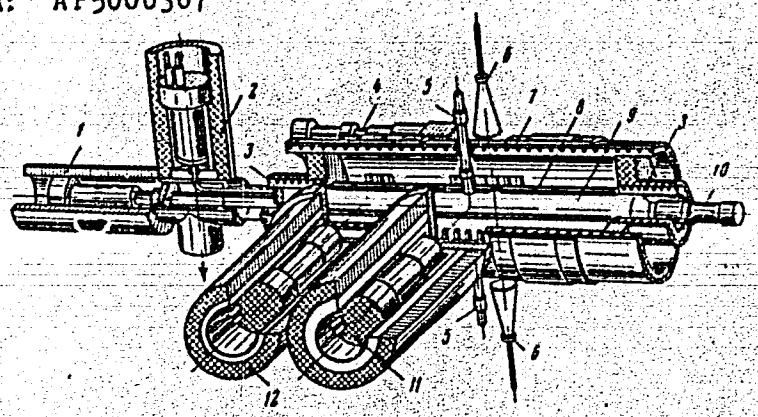

Fig. 1. Experimental setup

1, 2 - Longitudinal x-ray probes; 3 - magnetic-mirror coils; 4 - monochromator with photomultiplier; 5 - ion probes; 6 - microwave probes; 7 - coil for adiabatic compression; 8 - high-frequency shock excitation circuit; 9 - vacuum chamber; 10 - plasma injector; 11 - scintillation counter with collimator; 12 - monitoring scintillation counter.

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

L 16108-65 EWT(1)/EWP(m)/EWG(k)/EPA(sp)-2/EPA(w)-2/EEC(t)/T/EEC(b)-2/FCS(k)/EWA(m)-2/EWA(h) Pz-6/Po-4/Pd-1/Pab-10/Pi-4 ESD(t)/AFDC(a)/SSD(b)/ASD(a)-5/AS(mp)-2/ASD(p)-3/AFETR/RAEM(a)/IJP(c) AT

ACCESSION NR: AP5000319 S/0056/64/047/005/1717/1720/

AUTHORS: Zagorodnikov, S. P.; Rudakov, L. I.; Smolkin, G. Ye.; Sholin, G. V. B

TITLE: Observation of shock waves in a collision-free plasma

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, no. 5, 1964, 1717-1720

TOPIC TAGS: plasma electromagnetic wave, shock front propagation, discharge plasma, electron temperature, compression shock wave

ABSTRACT: The purpose of the investigation was to clarify the character of propagation of a strong electromagnetic wave in a rarefied plasma, to study the possibility of existence of shock waves in such a plasma, and to investigate the energy-dissipation mechanism that leads to the heating of the electrons in the plasma. The experiments were made under conditions analogous to those used in

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ACCESSION NR: AP5000319

earlier studies of turbulent heating. The experimental setup was similar to that described by the authors elsewhere (ZhETF v. 45, 1850, 1963), except that a larger discharge chamber (6 cm in diameter) was used, and the high frequency resonant circuit was an artificial line which produced a trapezoidal magnetic pulse in the discharge chamber. The plasma density ranged from $\sim 10^{11}$ to $\sim 10^{14}$ cm^{-3}. Many of the procedures were the same as in the earlier study. A compression shock wave was observed, traveling from the periphery towards the axis of the discharge tube with a velocity close to Alfven velocity. The shock wave had a sharply delineated front in which an intense dissipative process is developed with a jump in the electron temperature from ~0.1 eV ahead of the front to several hundred eV behind the front. The time width of the front did not exceed (3--4) x 10^{-8} sec. At least a 2.5-fold increase in the steepness of the compression wave was observed, with a minimum time width ~2 x 10^{-8} sec. The propagation of a rarefaction wave in the collision-free plasma was not accompanied by for-

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ACCESSION NR: AP5000319

mation of a shock wave, and in this case the wave front is compressed. "The author thanks Ye. K. Zavoyskiy for interest in the work and for useful discussions." Orig. art. has: 2 figures.

ASSOCIATION: None

SUBMITTED: 16Jun64 ENCL: 00

SUB CODE: ME NR REF SOV: 004 OTHER: 000

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

L 18263-65 EWT(1)/EWG(k)/EPA(sp)-2/EPA(w)-2/EEC(t)/T/EEC(b)-2/EWA(m)-2
Pz-6/Po-4/Pab-10/Pi-4 IJP(c)/ASD(p)-3/SSD(b)/AS(mp)-2/AFETR/AFWL/SSD/AEDC(b)/
ACCESSION NR: AP5000908 RAEM(a)/AEDC(a)/ S/0020/64/159/004/0767/0770
ESD(gs) AT

AUTHOR: Vedenov, A. A.; Rudakov, L. I.

TITLE: Wave interaction in continuous media

SOURCE: AN SSSR. Doklady, v. 159, no. 4, 1964, 767-770

TOPIC TAGS: plasma hydrodynamics, plasmon, plasma electron temperature, plasma instability

ABSTRACT: The authors show that interactions occurring in continuous media between collective oscillations belonging to different vibrational branches, and as a rule differing greatly in frequency, can be described with the aid of a self-consistent system of equations comprising the kinetic equation for the distribution function of the high frequency waves (in six-dimensional space of the coordinates and wave vectors), and equations of the hydrodynamic types for the variations of the density, velocity, and pressure of the material. This system of equations can be used to investigate processes whose periods and wavelengths greatly exceed the period and wavelength of the high frequency oscillations. The equations contain only average characteristics of the high frequency

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ACCESSION NR: AP5000908

waves, which under these conditions can be regarded as quasiparticles. The resultant self-consistent system, which describes the interaction between the high frequency oscillations (quasiparticles) and the field of the low-frequency waves, is used to calculate several effects in an isotropic plasma with hot electrons. This includes the damping of the ionic-sound wave in a gas of Langmuir plasmons, the instability of a cold gas of Langmuir plasmons, the criterion for instability of a hot plasmon gas, and the interaction of plasmons with a random field of ionic-sound waves. "We thank D. D. Ryutov for useful discussions." This report was presented by M. A. Leontovich. Orig. art. has: 20 formulas.

ASSOCIATION: None

SUBMITTED: 12May64 ENCL: 00

SUB CODE: ME NR REF SOV: 001 OTHER: 000

Card 2/2

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

L 14032-65 EEC(b)-2/EPA(w)-2/EWG(k)/EWT(1)/EEC(t)/EPA(sp)-2/T/EWA(m)-2
Pi-4/Po-4/Pz-6/Pab-10 ASD(a)-5/AFWL/AEDC(b)/AEDC(a)/SSD/ASD(p)-3/AFETR/
ESD(gs)/ESD(t)/IJP(c) AT

ACCESSION NR: AP4047934 S/0056/64/047/004/1597/1600

AUTHORS: Baby*kin, M. A.; Gavrin, P. P.; Zavoyskiy, Ye. K.; Rudakov, L. I.; Skoryupin, V. A.

TITLE: Turbulent heating of a plasma in a direct discharge

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, no. 4, 1964, 1597-1600

TOPIC TAGS: turbulent plasma, plasma heating, discharge plasma, ionized plasma, plasma injection, bremsstrahlung

ABSTRACT: A direct experiment in which the discharge is produced between end electrodes is reported, aimed at explaining the strong electron heating observed in an earlier investigation by the authors (ZhETF v. 46, 1050, 1964), and which cannot be attributed to turbulent heating by the magnetohydrodynamic wave. A current was made to flow through a fully ionized plasma with density $\sim 10^{12}$ cm^{-3}, pro-

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ACCESSION NR: AP4047934

duced by plasma injectors. The plasma was adiabatically compressed by a factor 25 after heating by the current. The magnetic field at the instant of injector operation and during the direct discharge was 350 Oe, and rose to 9×10^3 Oe at the maximum of compression. The electron temperature estimated from the spectral distribution of the bremsstrahlung is ~200 keV, and the ion temperature ~3 keV. In addition to the hard bremsstrahlung, neutrons amounting to $\sim 10^5$ per pulse were also recorded. The heating is due to the discharge of an appreciable fraction of the energy of one of the injectors through the plasma along the magnetic field to the other injector, occurring when the electron velocity reaches a certain critical value. The plasma thus produced was contained in the magnetic mirror during the entire lifetime of the magnetic field, approximately 2 msec. "The authors thank A. I. Gorlanov who directly participated in the experiments." Orig. art. has: 4 figures.

ASSOCIATION: None

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ACCESSION NR: AP4047934

SUBMITTED: 22Jul64

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SUB CODE: ME

NR REF SOV: 005

OTHER: 000

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

L 47367-65 EPF(n)-2/EPA(w)-2/EWT(1)/EWG(m) Pi-4/Po-4/Pz-6/Pab-10 IJP(c) AT/WW

ACCESSION NR: AP5008750 S/0056/65/048/003/0913/0920

40
B

AUTHOR: Dikasov, V. M.; Rudakov, L. I.; Ryutov, D. D.

TITLE: Interaction of negative energy waves in a weakly turbulent plasma 21

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 3, 1965, 913-920

TOPIC TAGS: plasma equilibrium, plasmon, quasiparticle, negative energy wave, plasma wave interaction, plasma turbulence

ABSTRACT: Certain features of the interaction between quasi-particles corresponding to longitudinal translations of a uniform plasma in the absence of a magnetic field are considered under the assumption that the interaction between the quasi-particles and the particles can be neglected. It is shown that statistical equilibrium cannot be established in a quasi-particle gas if there are quasi-particles of both positive and negative energy. Under these conditions, the fact that the quasi-particle entropy must increase means that the number of quasi-particles grows without limit. As a concrete example, the authors consider the interaction of waves in a quasi-neutral plasma through which ion beams move in the direction

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L 47357-65

ACCESSION NR: AP5008750

of the magnetic field. The rate of growth of the number of quasi-particles is estimated. It is concluded that this effect can lead to anomalous diffusion even in a plasma that is stable in the linear approximation, and is of interest from the point of view of conversion of energy of ordered beam motion into heat. Orig. art. has: 1 figure and 28 formulas.

ASSOCIATION: None

SUBMITTED: 10Sep64 ENCL: 00 SUB CODE: ME

NR REF SOV: 007 OTHER: 000

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

L 58453-65 EWT(1)/EPF(n)-2/EWG(m)/EPA(w)-2 Pz-6/Po-4/Pab-10/Pi-4 LJP(c)
WW/AT

ACCESSION NR: AP5013896 UR/0056/65/048/005/1372/1385

AUTHOR: Rudakov, L. I.

TITLE: Problems in the theory of nonlinear oscillations of an inhomogeneous plasma

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 5, 1965, 1372-1385

TOPIC TAGS: plasma stability, plasma oscillation, nonlinear oscillation, inhomogeneous plasma, plasma drift wave, plasma turbulence, flute instability

ABSTRACT: The author reviews some of his earlier results (with A. A. Galeyev, ZhETF v. 45, 647, 1963; with A. A. Vedenov, DAN SSSR, v. 159, No. 4, 1964) and derives equations that describe the interaction of drift waves in a weakly turbulent inhomogeneous plasma. In contrast with earlier work, the electric field oscillations are expanded not in plane waves but in the WKB solutions

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ACCESSION NR: AP5013896

of the linear problem. Conditions under which flute instability arises in a weakly turbulent plasma are then derived, and the time necessary to destroy the plasma boundary is estimated. 'I thank A. V. Gordeyev for useful discussions.' Original article has: 44 formulas

ASSOCIATION: None

SUBMITTED: 17Nov64 ENCL: 00 SUB CODE: ME

NR REF SOV: 007 OTHER: 000

Card 2/2

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

ZAGORODNIKOV, S.P.; RUDAKOV, L.I.; SMOLKIN, G.Ye.; SHOLIN, G.V.

Study of the front structure of a strong magnetosonic wave in a rarefied plasma. Pis'. v red. Zhur. eksper. i teoret. fiz. 2 no.5:238-241 S '65. (MIRA 18:12)

1. Submitted July 17, 1965.

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L 22132-66 EWT(1)/ETC(f)/EPF(n)-2/EWG(m) IJP(c) AT

ACC NR: AP6004940 SOURCE CODE: UR/0056/66/050/001/0220/0231

68
13

AUTHOR: Rudakov, L. I.; Korablev, L. V.

ORG: none

TITLE: Quasilinear theory of current instability in a plasma

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 50, no. 1, 1966, 220-231

TOPIC TAGS: plasma instability, electron temperature, ion temperature, Coulomb collision, plasma interaction, plasma oscillation, plasma heating, plasma flow, electric field, current stabilization

ABSTRACT: The authors present an analytic solution of the problem of instability of a current flowing in a plasma situated in a specified electric field, in the quasilinear approximation. The electron temperature is assumed to be much higher than the ion temperature. Coulomb collisions are neglected completely. The initial equations are the same as used by E. C. Field and B. D. Fried (Phys. Fluids v. 7, 1937, 1964), except that in the present article the authors take into account several additional important features of the phenomenon. The specified electric field is assumed to be sufficiently large so that the Coulomb collisions do not interfere with the free acceleration of most of the electrons. The re-

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ACC NR: AP6004940

sultant equation is similar to that describing the behavior of a Lorentz plasma in an electric field, except that the role of the ions is assumed in the present article by ion-acoustic oscillations which are excited in the plasma by the current instability. The interaction between the electrons and the ion-acoustic oscillations is analyzed in the quasilinear approximation, in which the electrons are scattered by the oscillations almost elastically with frequency $\sim v^{-3}$, just as in the Lorentz plasma. The buildup of the ion-sound oscillations in the case of the current instability is described in detail. It is shown that during a certain period of time the current remains constant and subsequently, as a result of the electron heating, runaway electrons appear and thus cause an increase of the current with further increase in time. The rate of ion heating during the process is also calculated. The results are applied to the instability of the current in a bounded plasma and in a strong magnetic field. Orig. art. has: 34 formulas.

SUB CODE: 20/ SUBM DATE: 24Jul65/ ORIG REF: 004/ OTH REF: 004

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

L 25676-66 EWT(1)/ETC(f)/EPF(n)-2/EWG(m)/ETC(m)-6 IJP(c) WW/AT

ACC NR: AT6001559 SOURCE CODE: UR/3136/65/000/909/0001/0008

AUTHOR: Zagorodnikov, S. P.; Rudakov, L. I.; Smolkin, G. Ye.; Sholin, G. V.

ORG: none

83
80
B+1

TITLE: Investigation of the structure of a strong magnetosound wave front in rarefied plasma

SOURCE: Moscow. Institut atomnoy energii. Doklady, IAE-909, 1965. Issledovaniye struktury fronta sil'noy magnitno-zvukovoy volny v razrezhennoy plazme, 1-8

TOPIC TAGS: plasma magnetic field, sound wave, magnetic field, rarefied plasma, constant magnetic field, plasma wave

ABSTRACT: This is a continuation of previous experiments reported by the authors in ref. 4 (ZhETF, 47, 1717, 1964). The experiments were inspired by the work of J. H. Adlam and J. E. Allen (Proc. Phys. Soc. London, 75, 640, 1960), where a numerical solution was found for the problem of the unsteady motion of a magnetic piston along rarefied plasma, based on two concrete formulas on the change of the magnetic field in time at the boundary of plasma:

$$H_n(t_n) = 1 + \alpha t_n \qquad (1)$$

and

$$H_n(t_n) = 1 + \beta\left[1 - \exp(-\alpha t_n)\right] \qquad (2)$$

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The profile of the magnetic field of plasma was found for certain values of t_n, when $\alpha = 1$ and $\beta = 1$. The experiments were conducted under conditions similar to those reported by the authors in ref. 4. The wave was excited by a trapezoidal impulse of the magnetic field π, developed at the boundary of a cylindrical plasma column with a diameter of 6 cm and length of 30 cm, within the constant magnetic field H_0. The period of the impulse was $\tau_0 = 5.5 \times 10^{-8}$ sec. The plasma density n_0 preceding the wave front varied between $\sim 0.5 \times 10^{12}$ and $\sim 6 \times 10^{13}$ cm^{-3}. The magnetic Mach number μ varied between 1.3 and 4.2. For all values of μ there was observed a process of nonlinear rotation in the plasma as compared with the front given in formulas (1) or (2). No abnormal growth in the width of the front was observed in the $2<\mu<4.2$ region. This is apparently related to the unstabilized character of the wave front in these experiments. All other results coincide with the findings of Adlam and Allen. In conclusion, the authors note that they have observed during their experiments an absorption of wave energy at the front, which grew with the increase of n_0. In the plasma behind the wave front, electrons with an energy of 50 cv appeared. The authors thank E. K. Zavoyskiy for his interest in the experiments and A. A. Vedenov and E. P. Velikhov for their valuable discussions. Orig. art. has: 2 formulas and 3 figures.

SUB CODE: 20 / SUBM DATE: 00/ ORIG REF: 002/ OTH REF: 008

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

ACC NR: AP6037082 SOURCE CODE: UR/0056/66/051/[illegible]/1522/1534

AUTHOR: Ivanov, A. A.; Rudakov, L. I.

ORG: none

TITLE: Dynamics of quasilinear relaxation of a collisionless plasma

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 51, no. 5, 1966, 1522-1534

TOPIC TAGS: plasma stability, relaxation process, distribution function, plasma oscillation, plasma injection

ABSTRACT: The authors investigate the laws governing the variation of the distribution function in a quasilinear relaxation process occurring in a plasma, starting with a system of quasilinear equations for one-dimensional Langmuir oscillations. The self-similar solution of the quasilinear equation is obtained for the case when a small group of electrons has at the initial instant of time a high velocity compared with the other electrons (corresponding to the presence of a small electron beam in the plasma). The distribution function at each instant of time has the form of a step with a steep front, moving in the direction of lower velocities. The time constant of the quasilinear relaxation of the beam is determined. It is shown that the quasilinear relaxation process that results from the equations does not change noticeably for a large number of other initial distribution functions. An equation is derived for the velocity of the steep front of the wave. The stationary distribu-

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

ACC NR: AP6037082

tion function and the Langmuir-oscillation spectrum are obtained as functions of the coordinates in the case of stationary injection of an electron beam in a plasma. The authors thank D. D. Ryutov for useful discussions. Orig. art. has: 4 figures and 38 formulas.

SUB CODE: 20/ SUBM DATE: 02Jun66/ ORIG REF: 011

Card 2/2

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, L.M.; KLOCHKO, A.K.

Reorganization of the sintering plant at the Kommunarsk Metallurgical Plant. Met. i gornorud. prom. no.3:15-17 My-Je '64. (MIRA 17:10)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

TUSHINSKIY, Georgiy Kazimirovich, prof., doktor geograf.nauk. Prinimal uchastiye RUDAKOV, L.M., BYALOBZHESKIY, G.V., red.; CHVANOV, V.G., red.izd-va; DONSKAYA, G.D., tekhn.red.

[Protecting highways from snow slides] Zashchita avtomobil'nykh dorog ot lavin. Moskva, Nauchno-tekhn.izd-vo M-va avtomobil'nogo transp. i shosseinykh dorog RSFSR, 1960. 152 p. (MIRA 13:5)

1. Moskovskiy gosudarstvennyy universitet (for Rudakov). 2. Gosudarstvennyy vsesoyuznyy dorozhnyy nauchno-issledovatel'skiy institut (SOYUZDORNII) (for Byalobzheskiy).
(Roads--Snow protection and removal)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, L.M.; GORSHTEYN, I.I.

Effect of loading and unloading on changes in the granular composition of sinters. Metallurg 6 no.4:4-6 Ap '61. (MIRA 14:3)

1. Nachal'nik aglogruppy TSentral'noy zavodskoy laboratorii Alchevskogo metallurgicheskogo zavoda (for Rudakov). 2. Voroshilovskiy gornometallurgicheskiy institut (for Gorshteyn).
(Sintering)
(Materials handling)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, L.M.; GORSHTEYN, I.I.; [redacted], L.M.

Operation of a new type of single-roll crusher. Metallurg 6 no.10:9-10 O '61. (MIRA 14:9)

1. Alchevskiy metallurgicheskiy zavod i Alchevskiy gornometallurgicheskiy institut.

(Crushing machinery)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

ABRAMOVICH, M.N., inzh.; GORSHTEYN, I.I., kand.tekhn.nauk; MASYURA, I.M., inzh.; BOL'SHAKOV, A.A., inzh.; RUDAKOV, L.M., inzh.; FREYDIN, L.M., inzh.; Prinimali uchastiye: SUBBOTIN, Ye.P.; TERTYSHNYY, V.P.; MAKSIMCHIK, N.F.; BOYKO, S.G.

Practices of the Alchevsk sintering plant. Stal' 21 no.10:869-873 O '61. (MIRA 14:10)

1. Alchevskiy metallurgicheskiy zavod i Voroshilovskiy gornometallurgicheskiy institut.
(Voroshilovsk--Sintering)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, L.M.

Liparite residuals on the Elbrus. Vest. Mosk.un. Ser. 5: Geog. 16 no.5:72-73 S-O '61. (MIRA 14:9)
(Elbrus Mountain--Rhyolite)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, L.M.; GORSHTEYN, I.I., kand.tekhn.nauk

Screening of hot sinter. Metallurg 6 no.2:3-4 F '61. (MIRA 14:1)

1. Nachal'nik aglomeratsionnoy gruppy TSentral'noy zavodskoy laboratorii zavod im. Voroshilova (for Rudakov). 2. Voroshilovskiy gorno-metallurgicheskiy institut (for Gorshteyn).
(Sintering)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, L.M.

Glacial and geomorphological studies in the area of the northern slope of Mount Elbrus. Inform.sbor. o rab. Geog. fak. Mosk. gos. un. po Mezhdunar. geofiz. godu no.2:99-116 '58. (MIRA 15:10)
(Elbrus, Mount—Glaciers) (Elbrus, Mount—Geomorphology)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

FREYDIN, L.M., inzh.; RUDAKOV, L.M., inzh.

New developments in research. Stal' 23 no.7:600 Jl '63. (MIRA 16:9)

(Blast furnaces)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

ZHETVIN, N.P., kand.tekhn.nauk; FREYDIN, L.M., inzh.; RUDAKOV, L.M., inzh.

New developments in research. Stal' 23 no.7:652 Jl '63. (MIRA 16:9)

(Steel--Heat treatment)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

FREYDIN, L.M.; RUDAKOV, L.M.; GORSHTEYN, I.I.

Sintering with a various amount of anthracite dust in the fuel. Metallurg 8 no.10:3-4.O '63. (MIRA 16:12)

1. Kommunarskiy metallurgicheskiy zavod i gornometallurgicheskiy institut.

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, L.M.

Dynamics of the glaciation of Mount Elbrus in the histroical time. Inform.sbor.o rab.Geog.fak.Mosk.gos.un.po Mezhdunar. geofiz.godu no.9:117-125 '62. (MIRA 16:2)
(Elbrus, Mount--Glaciology)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

KORONOVSKIY, N.V.; RUDAKOV, L.M.

Age of the last eruptions of Mount Elbrus. Izv.vys.ucheb.zav.; geol.i razv. 5 no.8:133-135 Ag '62. (MIRA 15:11)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
(Elbrus, Mount--Volcanoes)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

HUDAKOV, L.P.

Automatic dynamometer developed in the IVS AN SSSR for testing

Report presented at the 13th Conference on high molecular compounds
Moscow, 8-11 Oct 62

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, M.A.

Improving the design of foam filters. Ogneupory 28 no.10: 443-444 '63. (MIRA 16:11)

1. Chasov-Yarskiy kombinat ogneupornykh izdeliy.

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, M. I.

Category: USSR / Diseases of Farm Animals. Diseases of Undetermined Etiology. V-4

Abs Jour: Refer. Zhur-Biologiya, No 16, 1957, 72332

Author : Rudakov M. I.
Inst : Not given
Title : Enzootic Orcho-epididimitis in Male Deer

Orig Pub: Tr. N. I. In-ta S.-Kh. Krayn. Severa, 1956, 3, 112-118

Abstract: In male deer a disease was observed with symptoms of purulent epididimitis, orchitis, and periorchitis. The disease appeared in the half-horned age, but was found more frequently in the adult animals. The symptoms of the disease: increase in the volume of "mashonka" (to the size of a child's head), with a presence of fluctuating sections and fistulas. The testicles are of a firm knobby consistency. In the pathologico-anatomical study of the testicles there were found areas in the parenchyma from the size of a pin-head to that of a walnut, which were filled with a yellowish mass of purulent material. An analogous picture was found in the appendages. By means of histology the author established a

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

Category: USSR / Diseases of Farm Animals. Diseases of Undetermined Etiology. V-4

Abs Jour: Refer. Zhur-Biologiya, No 16, 1957, 72332

chronic inflammation with proliferative occurences and necrosis. Not bacteriology was done. By comparing the histological picture of the involved appendages with the brucellar damage to the appendages of male pigs, the author expresses a suspicion as to the brucellar character of the observed disease.

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, M. L.

RUDAKOV, M. L. Surveying in open-pit mining Sverdlovsk, Gos. nauchno-tekh. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1950. 344 p. (50-31114)

TN273.R84

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, M. L.

Marsheyderskiy uchet gorno-eksploatatsionnykh rabot na kar'yerakh (Open-pit mining surveying calculations) Sverdlovsk, Metallurgizdat, 1952.
294 P.
"Literatura": P. (291)-292.

N/5
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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, M. L.

"Methods Based on Scientific Principles for Decreasing Mineral Losses in Open-Pit Mining in the Urals." Dr Tech Sci, Sverdlovsk Mining Inst imeni V. V. Vakhrushev, Min Higher Education USSR, Sverdlovsk, 1954. (KL, No 8, Feb 55)

SO: Sum. No. 631, 26 Aug 55-Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (14)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, Mikhail Lazarevich.

Academic degree of Doctor of Technical Sciences, based on his defense 14 February 1955, in the Council of Sverdlovsk Mining Inst imeni Vakhrushev, of his dissertation entitled: "Scientific Bases of Methods for Reducing Waste of Useful Minerals During Open Exploitation of Deposits in the Urals."

Academic degree and/or title: Doctor of Sciences

SO: Decisions of VAK, List no. 14, 11 June 55, Byulleten' MVO SSSR, No. 15, Aug 56, Moscow, pp. 5-24, Uncl. JPRS/NY-537

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, Mikhail Lazarevich, prof.; GUSEV, Nikolay Andreyevich, dotsent; FILATOV, Sergey Aleksandrovich, kand.tekhn.nauk; NENAZHIVIN, Aleksandr Vasil'yevich, inzhener; RASHKOVSKIY, Yakov Zel'manovich, inzhener; SMOL'NIKOV, Pavel Alekseyevich, inzhener; ZORIN, Il'ya Petrovich, inzhener; LOGINOVSKIY, Vasiliy Mikhaylovich, inzhener; BUTKEVICH, T.V., red.; LISHUTIN, B.G., red.; LUCHKO, Yu.V., red.izdatel'stva; ZKF, Ye.M., tekhn.red.

[Mine surveying in strip mining] Marksheiderskie raboty na kar'erakh. Pod obshchei red.B.G.Lishutina i A.V.Nenazhivina. Sverdlovsk, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, Sverdlovskoe otd-nie, 1957. 691 p. (MIRA 10:12)
(Mine surveying)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

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RUDAKOV, M.L.; ZOTEYEV, V.G.; MOKHAYEV, L.V.

Determination of the elements in the position of joints in using open-pit and underground methods of working iron ore deposits. Trudy Inst. gor. dela UFAN SSSR no.5:107-111 '63. (MIRA 16:9)
(Joints (Geology)) (Iron mines and mining) (Mine surveying)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RYZHOV, Petr Aleksandrovich. Prinimali uchastiye: BUKRINSKIY, V.A., kand. tekhn.nauk, dots.; GUDKOV, V.M., kand.tekhn.nauk, dots.; RUDAKOV, M.L., doktor tekhn.nauk, prof.; SHEYKO, V.G., inzh.; BYSTRIGIN, N.M., inzh.; TROFIMOV, A.A., prof., retsenzent; OGLOBLIN, D.N., prof., retsenzent; SLAVOROSOV, A.Kh., red.izd-va; BOLDYREVA, Z.A., tekhn. red.; EPPEL', N.Ya., tekhn. red.; SHITOVA, A.S., tekhn. red.

[Geometry of mineral deposits] Geometriia nedr. Izd.3., perer. i dop. Moskva, Izd-vo "Nedra," 1964. 500 p. (MIRA 17:3)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

YESHUTKIN, N.V.; RUDAKOV, M.L.

Some results of rock pressure studies in working ore veins of the Vostochnyy Kounrad Mine. Trudy Inst. gor. dela UFAN SSSR no.5:5-11 '63. (MIRA 16:9)
(Kounrad region--Rock pressure) (Mining engineering)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, M.L.; SASHURIN, A.D.

Measuring stresses by the method of partial unloading. Trudy Inst. gor. dela UFAN SSSR no.5:29-34 '63. (MIRA 16:9)
(Rock pressure--Measurement)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, M.L.

Stability of the sides of deep pits. Trudy Inst. gor. dela UFAN SSSR no.5:67-89 '63. (MIRA 16:9)
(Rocks--Testing) (Landslides)

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RUDAKOV, M.L.; LI, A.P.

Physicomechanical properties of rocks and angles of incline of the sides of some Kazakhstan pits. Trudy Gor.-geol. inst. UFAN SSSR no.57:33-45 '61. (MIRA 15:3)
(Kazakhstan--Strip mining) (Rocks--Testing)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, M.L.

Preventing the sliding of pit sides. Trudy Gor.-geol. inst. UFAN SSSR no.57:59-65 '61. (MIRA 15:3)

(Strip mining)

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RUDAKOV, M.L.

Coordination of calculations of the stability of pit sides and the technology and parameters of mining operations. Trudy Gor.-geol. inst. UFAN SSSR no.57:83-90 '61. (MIRA 15:3)
(Strip mining)

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RUDAKOV, M.L.

State of and problems in future studies of the stability of pit sides. Trudy Gor.-geol. inst. UFAN SSSR no.57:127-136 '61. (MIRA 15:3)

(Strip mining) (Rocks--Testing)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, M.L.; POPOV, I.I.; LI, A.P.; DIDKOVSKIY, D.Z., otv.red.; BYKHOVSKAYA, S.M., red.izd-va; POLILUYEV, V.A., tekhn.red.; BERESLAVSKAYA, L.Sh., tekhn.red.

[Prevention of sliding in opne-cut mines] Preduprezhdenie opolznei na kar'erakh. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po gornomu delu, 1960. 134 p. (MIRA 14:1)
(Strip mining) (Soil mechanics)

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RYZHOV, Petr Aleksandrovich, prof., doktor tekhn.nauk; BUKRINSKIY, Viktor Aleksandrovich, dotsent, kand.tekhn.nauk; GUDKOV, Valentin Mikhaylovich, kand.tekhn.nauk; KROTOV, Gavriil Alekseyevich, dotsent, kand.tekhn.nauk; LYUBMAN, Izrail' Borisovich, assistent; RUDAKOV, Mikhail Lazarevich, prof., doktor; PIKULIN, A.P., kand. tekhn.nauk, retsenzent; BUTKEVICH, T.V., red.; PARTSEVSKIY, V.N., red.izd-va; BEKKER, O.G., tekhn.red.

[Mine surveying] Marksheiderskoe delo. Pod nauchnoi red. P.A. Ryzhova. Moskva, Gos. nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1958. 463 p. (MIRA 12:1)
(Mine surveying)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, M.L., prof., doktor tekhn.nauk

Determining an efficient depth for a pit. [Trudy] VNIMI no.45:100-105 '62. (MIRA 16:4)

(Strip mining) (Mine surveying)

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FROLOV, P.A.; RUDAKOV, M.Ye.

Aerial communication cables. Elektrosviaz' 18 no.10:71-75 O '64. (MIRA 17:12)

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KORSHIKOV, G.V., inzh.; VOROHOV, Yu.G., inzh.; TSEYTLIN, M.A., inzh.; KIYASHKO, Yu.N., inzh.; GOROKHOV, A.S., inzh; SEKACHEV, M.A., inzh; Prinimali uchastiye: ARSHINOV, G.P.; GRIGOR'YEV, Ye.I.; KUVARIN, Yu.N.; RUDAKOV, N.V.; BUYEV, V.Ye.; IOGL'NITSYN, A.N.

Investigating the oxidizing zone of a blast furnace working under oxygen-enriched blowing (35% oxygen) and using natural gas. Stal' 25 no.8:781-790 S '65. (MIRA 18:9)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, O.L.

Evolutionary conditions determining the formation of imperfect fungi and the biological role of heterokaryosis. Trudy VIZR no.23:175-183 '64. (MIRA 19:2)

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, O.L.

Development of mycology and phytopathology in Kirghizistan.
Trudy VIZR no.23:321-326 '64. (MIRA 19:2)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, P., kand.arkhitektury

New designs of homes for the aged. Zhil.stroi. no.12:20-23 '64. (MIRA 18:2)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5"

"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, O.L., kand.biolog.nauk

First results of biological control of dodder. Zashch. rast. ot vred. i bol. 8 no.8:25-26 Ag '63. (MIRA 16:10)

1. Institut botaniki AN Kirgizskoy SSR, Frunze.

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

RUDAKOV, P., arkhitektor

The occupancy and operation of apartment houses for single persons and families of two. Zhil. stroi. no.6:7-9 '63. (MIRA 16:10)

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L 25995-66 EWT(1)/EPF(n)-2/ETC(m)-6 WW/GG

ACC NR: AP6012554 SOURCE CODE: UR/0040/66/030/002/0362/0368

AUTHOR: Rudakov, R. N. (Perm')

ORG: none

TITLE: Small perturbations of convective motion between vertical parallel surfaces

SOURCE: Prikladnaya matematika i mekhanika, v. 30, no. 2, 1966, 362-368

TOPIC TAGS: Prandtl number, heat convection, perturbation, fluid flow, fluid viscosity, boundary value problem, incompressible fluid, thermal expansion

ABSTRACT: A plane vertical layer of viscous incompressible fluid between two infinite uniformly heated surfaces is examined. The behavior of normal perturbations in the quiescent fluid and in the convection current when there is a small temperature difference between the surfaces is studied. The following boundary value problem for small plane perturbations is obtained from ordinary equations of free convection:

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ACC NR: AP6012554

$$\Delta^2\Psi - \frac{\partial}{\partial t}\Delta\Psi + \frac{\partial\theta}{\partial x} = G\left(v_0\frac{\partial}{\partial z}\Delta\Psi - v_0''\frac{\partial\Psi}{\partial z}\right)$$

$$\left(\Delta = \frac{\partial}{\partial x^2} + \frac{\partial}{\partial z^2}\right)$$

$$\frac{1}{P}\Delta\theta - \frac{\partial\theta}{\partial t} = G\left(v_0\frac{\partial\theta}{\partial z} - T_0'\frac{\partial\Psi}{\partial z}\right)$$

$$\left(G = \frac{g\beta\theta L^3}{\nu^2},\quad P = \frac{\nu}{\varkappa}\right)$$

$$\frac{\partial\Psi}{\partial z} = \frac{\partial\Psi}{\partial x} = \theta = 0 \text{ for } z = \pm 1)$$

where G is the Grashof number; P is the Prandtl number; ν is the kinematic viscosity; g is the acceleration of gravity; and β is the coefficient of thermal expansion. Normal perturbations of the form

$$\Psi(x, z, t) = \Phi(z)e^{-(\lambda t + ikx)}, \qquad \theta(x, z, t) = T(z)e^{-(\lambda t + ikx)},$$

where k is the real positive wave number and λ the complex decrement, are examined. Spectra of the decrements for k = 1 and certain values of the Prandtl number ($0.14 \leqslant P \leqslant 1.26$) are obtained in approximations. In the range of P in question, the critical value of the Grashof number varies little. The author thanks G. Z. Gershuni for formulating the problem and assistance in the work. Orig. art. has: 23 formulas and 4 graphs.

SUB CODE: 20,12/ SUBM DATE: 09Nov65/ ORIG REF: 004

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"APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R001445910011-5

BRILL', O.D.; PANKRATOV, V.M.; RUDAKOV, V.P.; RYBAKOV, B.V.

Cross sections of the reactions $T(d, n)He^4$ and $D(d, n)He^3$ in the 3 - 19 Mev. deuteron energy range. Atom. energ. 16 no.2:141-143 F '64. (MIRA 17:3)

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AUTHORS: Matveyev, O.A.; Rudakov, V.P.; Serikov, I.N.

TITLE: The spectrometric measurement of charged heavy particles of medium energy with silicon n-i-p'-detectors.

SOURCE: Atomnaya energiya, v.16, no.4, 1964, 360-362

TOPIC TAGS: silicon detector, spectrometry, acceptor admixture, charged particles, cyclotron, lithium ion drift, scattered ion, beta particle, gamma quanta, elastic peak, peak resolution, electronic noise

ABSTRACT: The silicon detectors widely employed in nuclear research can be used for an energy analysis only of particles whose path in the silicon does not exceed about 100 micron. The spectrometric measurement of particles with greater ranges (medium energy) requires a considerably higher detector sensitivity. This can be achieved by compensating the initial acceptor admixtures by way of a lithium (Li^+) ion drift in an electric field of an n-p junction. A study has been made of the characteristic features of such detectors with reference

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to medium-energy α-particles and protons. The measurements were made in a cyclotron at the Kurchatov Atomic Energy Institute. The tests with beta-particles and gamma-quanta have established that cooling the detector to a temperature of about -60 to -80C improves its resolution. All the further measurements were therefore made at a temperature of -70C. The above-mentioned measurements reveal that the above-described detectors are very suitable for use in experimental nuclear physics. Orig. art. has: 4 figures.

ASSOCIATION: None

SUBMITTED: 02Oct63 DATE ACQ: 01May64 ENCL: 00

SUB CODE: PH, NS NR REF SOV: 002 OTHER: 001

Card 2/2

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RUDAKOV, V.P.

A sufficient condition of the stability of motion in a finite interval of time. Dokl. AN BSSR 6 no.12:757-759 D '62. (MIRA 16:9)

1. Kiyevskiy gosudarstvennyy pedagogicheskiy institut imeni A.M. Gor'kogo. Predstavleno akademikom AN BSSR N.P.Yeruginym.

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RUDAKOV, V.V., kand.tekhn.nauk,; RUDAKOVA, N.N.; ASHKENAZI, E.L., red.; AKSEL'ROD, I.Sh., tekhn. red.

[International electrotechnical vocabulary] Mezhdunarodnyi elektrotekhnicheskii slovar', Moskva, Fizmatgiz. Group 35.[Electromechanical devices and their applications] Elektromekhanicheskie ustroistva i ikh primenenie. 1963. 69 p. (MIRA 17:2)

1. International Electrotechnical Commission.

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