KULIYEV, R.Sh.; SHAKHNOVICH, M.I.; SAMEDOVA, F.I.; MUSAYEV, G.T.; CHIKAREVA, N.I.; Prinimali uchastiye: ALIYEVA, A.; ALIYEVA, V.; KATKOVA, O.; BESSONOVA, Ye.; KURILINA, A.

Improving the quality of transformer oil from Buzovna crude oil. Khim. i tekh. topl. i masel 8 no.10:16-22 O '63.
(MIRA 16:11)

1. Institut neftekhimicheskikh protsessov AN AzerSSR.

L 9104-65

ACCESSION NR: AT3001318 S/2933/64/006/000/0225/0230

AUTHOR: Shakhnovich, M. I.; Ye. I. Bessonova; A. I. Kurilina

B

Beshkirskiy filial ... soyedineniy

birefringence, viscosity and dielectric ... oils from various crude petroleums ... pilot-plant samples and commercial oils from various crude petroleums by the express method (oxidation ... Data on oxidizability obtained by the ... 12 hours under

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ACCESSION NR: AT3001318 2

refined oils, tg δ (the angle of dielectric loss) is already increased by 100% after 240 hrs ;

[illegible] is higher tg δ at [illegible] and the for[illegible]

2/2

KURILINA, T.S.

Complications developed as the result of internal and subcutaneous use of atropine preparations. Vrach. delo no.7:145-146 Jl'63.
(MIRA 16:10)

1. Kafedra glaznykh bolezney (zav. - prof. P.S.Plitas) Kiyevskogo meditsinskogo instituta i glaznoye otdeleniye klinicheskoy bol'nitsy imeni Oktyabr'skoy revolutsii.
(ATROPINE) (GLAUCOMA)

14(5) SOV/92-59-3-30/44

AUTHOR: Kurilkin, L.R., Laboratory Assistant

TITLE: The Organization of Oilfield Production and Work During the Next Seven Years (Organizatsiya proizvodstva i truda na neftyanykh promyslakh v predstoyashchim semiletii)

PERIODICAL: Neftyanik, 1959, Nr 3, p 25 (USSR)

ABSTRACT: In addition to advanced methods facilitating the exploitation of petroleum deposits, an important role will be assumed by the automation and telemechanization introduced to increase the productivity of labor and to eliminate manual work in various intricate operations connected with overhauling oil well subterranean equipment. It is expected that by 1965, 60 percent of all wells of the Soviet petroleum production industry will be automated and telecontrolled. According to tentative calculation, it will be possible to release at that time about 20,000 workmen. At present more

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than 300,000 oil well maintenance operations are carried out in the Soviet oilfields every year. Maintenance and overhauling of wells cost almost 350 million rubles per year. The organization of work in oilfields will be radically changed as a result of introducing automation and remote control. A certain category of specialists will become superfluous. Training of oilfield personnel will have to be revised and its educational level raised. This program will necessitate a change in the educational methods adopted by vuzes and technical schools. All of these problems have been discussed at the convention arranged in 1958 by the All-Union Petroleum and Gas Scientific Research Institute operating under the Gosplan of USSR. Materials pertaining to problems connected with the reorganization of petroleum production called for by the introduction of telemechanization, are being distributed among various oilfield units. They will help to work out recommendations necessitated by the introduction of automation and telemechanization.

ASSOCIATION: VNII(The All-Union Scientific and Research Institute)

LOSEV, M.T.; KURILKIN, L.R.

Oil field organization in connection with automatic and remote control of petroleum production. Trudy VNII no.26:140-158 '60. (MIRA 13:9)

(Oil fields—Production methods)
(Automation) (Remote control)

RYZHENKOV, I.I.; LOSEV, M.T.; KOLEMASOVA, I.M.; KURILKI..., L.R.;
TIKHONOVA, L.N.

Basic facors in the growth of labor ...oductivity in petroleum production of the Soviet Union. Trudy ..II no.39:187-199 '63. (MIRA 17:10)

Effect of the production organization and worki... conditi... on labor productivity in petroleum productio... Ibid.:200-213

RY[illegible], I.I.; K[illegible], L.R.; [illegible], I.M.; [illegible]; [illegible], V.V.

Fundamentals of the efficient organization and control of petroleum production. Nauch.-tekh. sbor. po [illegible]. nefti no.25:147-149 '64. (MIRA 17:12)

1. Vsesoyuznyy neftegazovyy nauchno-issledovatel'skiy institut.

LOSEV, Mikhail Timofeyevich; RYZHENKOV, Ivan Ivanovich; KURILKIN, Leonid Romanovich; KOLEMASOVA, Irina Maksimovna; TIKHONOVA, Lyudmila Nikolayevna; LATUKHINA, Ye.I., ved. red.; POLOSINA, A.S., tekhn. red.

[Labor productivity in petroleum production] Proizvoditel'nost' truda v dobyche nefti. Moskva, Gostoptekhizdat, 1963. 152 p. (MIRA 16:10)

(Petroleum production—Labor productivity)

KURILKIN, V.S., master

All-purpose set of implements for mechanical assembling operations. Suggested by V.S.Kurilkin. Rats.i izobr.predl.v stroi. no.13: 88-96 '59. (MIRA 13:6)

1. Krasnotur'inskoye montazhnoye upravleniye.
(Hoisting machinery)

KURILKO, G.P., inzh.

New method of rudder filling. Sudostroenie 29 no.7:67-68 Jl '63. (MIRA 16:9)

(Steering gear) (Foamed materials)

Distr: 4E4j

Determination of some ... by the ...

KURILKO, N.D., inzhener.

Insulating the reinforced concrete slabs used in bridge construction. Avt.dor. 17 no.2:27 S-O '54. (MIRA 8:4)

(Bridges, Concrete)(Precast concrete construction)

KURILKO, T.

Cafeteria on Kreshchatik Street. Obshchestv. pit. no.3:7 '57. (MIRA 11:3)

1. Direktor kafe No.310 na Kreshchatike, Kiyev.
(Kiev--Restaurants, lunchrooms, etc.)

KURILKO, V. I.

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: E.I. Brezdov and B.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 Reactors and Nuclear Power); Volume (3), Yadernoye goryucheye 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) edition of the proceedings have been noted in three articles where the texts are not identical; Akhiyezer, et al, "High Current Pulsed Discharge"; Akhiyezer, et al, via; Andrianov, et al, "High Current Pulsed Discharge"; and Bogolyubov, "Investigations of the Many-"High Frequency Plasma Oscillation"; and Bogolyubov, "Investigations of the Many-body Problem". The serial numbers of reports 2302 and 2504 are reversed in the English edition. Report 2211, by Sinelnikov, et al, is numbered 2536 in the English edition.

TABLE OF CONTENTS:

Reports of Soviet Scientists; Nuclear (Cont.) SOV/2081



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FAYNBERG, Ya.B.; KURILKO, V.I.

[Adiabatic invariants for a plasma in a magnetic field]
Ob adiabaticheskikh variantakh dlia plazmy v magnitnom pole. Khar'kov, Fiziko-tekhn. in-t AN USSR, 1960. 297-303 p. (MIRA 17:2)

KURILKO, V.I.

[Kinetic theory of the reflection of electromagnetic waves from a moving plasma] K kineticheskoi teorii otrazheniia elektromagnitnykh voln ot dvizhushcheisia plazmy. Khar'kov, Fiziko-tekhn. in-t AN USSR, 1960. 414-423 p. (MIRA 17:1)

(Electromagnetic waves) (Plasma (Ionized gases))

ACC NR: AP7001322 SOURCE CODE: UR/0057/66/036/012/2210/2212

AUTHOR: Krasovitskiy, V. B.; Kurilko, V. I.

ORG: none

TITLE: Oscillator acceleration by laser emission

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 12, 1966, 2210-2212

TOPIC TAGS: oscillator acceleration, particle acceleration, laser beam, ~~particle acceleration~~ laser emission, laser application

ABSTRACT: An analytical investigation was made of the possibility of using laser emission as a means for amplifying particle energy. The laser beam was considered a superposition of a large number of various oscillations of close frequencies and random phases. The analysis shows that the principles of particle acceleration by a resonant field are also valid, under certain circumstances, in the case of a laser beam despite the beam's wave phase differences and deviations from pure monochromatism. The required condition for acceleration is an appropriate pulse duration, which should not exceed a certain critical value. Pulse duration above the critical leads to a reduction of the acceleration rate. The acceleration effect is said to stem mainly from the resonant harmonics of the field, which are most effectively absorbed by

ACC NR: AP7001322

the oscillator. The authors thank Ya. B. Faynberg for suggesting the topic and for discussing the results. Orig. art. has: 9 formulas. [WA-14]

SUB CODE: 20/ SUBM DATE: 22Jul66/ ORIG REF: 006

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AUTHOR: Kurilko, V. I.

TITLE: The Reflection of Electromagnetic Waves From Moving Surfaces

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1960, Vol. 30, No. 5, pp. 504 - 507

TEXT: The present paper was read at the Jubilee-Session of the AS USSR (AS UkrSSR) held on the occasion of the 100. birthday anniversary of A. S. Popov (April 7, 1959). In the reflection of electromagnetic waves from moving surfaces, the double Doppler effect occurs (Ref. 1). In the case of nonrelativistic velocities of the reflecting surfaces, a single reflection may lead to considerable effects only in such cases in which these velocities are nearly equal to the phase velocity of the wave in the respective medium. This was pointed out for the first time by Ya. B. Faynberg. The corresponding investigation was carried out by the latter and by V. S. Tkalich. The effects of the frequency amplification and the amplification of the amplitude of the field may be considerably

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increased with a multiple reflection. This possibility was pointed out by Ya. B. Faynberg (Ref. 4) and E. L. Ginston (Ref. 5). The present paper deals with the quantitative investigation of these effects, which are connected with a multiple reflection. First, the simplified problem of a non-steady process in a space bounded by two ideally conductive planes is dealt with; the planes move towards each other with the velocities v; at first they are at a distance of 2a from each other; the field lying between them is expressed by the functions E(x) and H(x). The investigation is then extended to the entire range of the process and is applied to a multiple reflection. Formulas (4) and (10) are derived, by means of which it is possible to determine the field at any point between the planes at any instant t, so that the problem appears to be solved. On the basis of the investigation carried out, the following is found: 1.) As the distances at which the fields undergo essential changes decrease in the course of time, the characteristic wave numbers increase according to formula (10), and therefore also the frequencies of the compressed fields. 2.) The amplitudes of the fields between the planes increase with time. The cause of this increase is, on the one hand, the reduction of the volume, within which the field is enclosed, and on the other, the work

The Reflection of Electromagnetic Waves From Moving Surfaces

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performed by the external forces, which move the walls with the given rate against the pressure exerted by the compressed field. Both conclusions apply only to $\beta = \frac{v}{c} < 1$. Under real conditions, the dispersion of the reflection coefficients leads to the amplitude increasing only so long until the corresponding frequencies have attained their critical value (Refs. 2, 6). Ya. B. Faynberg suggested the subject of this paper to the author. G. Ya. Lyubarskiy discussed the paper with him. There are 6 references: 4 Soviet and 2 English.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR Khar'kov (Institute of Physics and Technology of the AS UkrSSR, Khar'kov)

SUBMITTED: July 2, 1959

Card 3/3

KURILKO, V.I. [Kurylko, V.I.]; MIROSHNICHENKO, V.I. [Miroshnychenko, V.I.]

Reflection of electromagnetic waves by plasma. Ukr. fiz. zhur. 6 no.3:415-416 My-Je '61. (MIRA 14:8)

1. Fiziko-tekhnicheskiy institut AN USSR, g. Khar'kov.
(Electromagnetic waves)
(Plasma(Ionized gases))

FAYNBERG, Ya.B.; Prinimali uchastiye: KURILKO, V.I.; KHARCHENKO, I.F.; SHAPIRO, V.D.

Interaction between beams of charged particles and a plasma. Atom. energ. 11 no.4:313-335 O '61. (MIRA 14:9)
(Particles (Nuclear physics)) (Plasma (Ionized gases))

20665

26.2212
24.2120 (1049, 1482, 1502, 1532)

S/057/61/031/001/010/017
B104/B204

AUTHOR: Kurilko, V. I.

TITLE: Kinetic theory of the reflection of electromagnetic waves from a moving plasma

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 31, no. 1, 1961, 71-77

TEXT: The author investigates the reflection of electromagnetic waves from a plasma moving in a space, in which the phase velocity, $V_{ph}$, of the waves is smaller than c. In experimental investigations, such reflections are studied in a waveguide. Here, the author assumes that a decreasing phase velocity is attained with the help of a suitable dielectric. As a reference system, a coordinate system resting in the plasma is chosen, in which the dielectric moves. Therefore, for determining the coupling between the vectors $\vec{D}$, $\vec{B}$, and $\vec{E}$, $\vec{H}$, the Minkowski equations may be used. By elimination of $\vec{D}$, $\vec{B}$, and $\vec{H}$, a system of equations is obtained from the Maxwell equations, which describes the interaction between electromagnetic waves and plasma in linear kinetic approximation:

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$$\left.\begin{aligned}
&\frac{d^2E^{\omega}_{x,y}}{dz^2}+a_1\frac{dE^{\omega}_{x,y}}{dz}+a_2E^{\omega}_{x,y}=j^{\omega}_{x,y},\\
&j^{\omega}_{x,y}=\frac{4\pi i\mu(1-\beta^2)|e|c^4}{\omega^4(1-\beta^2\varepsilon\mu)}\int v_{x,y}f^{\omega}_{(1)}d\mathbf{v},\\
&v_{\parallel}\frac{\partial f^{\omega}_{(1)}}{\partial z}-if^{\omega}_{(1)}+\Omega_{H}\frac{\partial f^{\omega}_{(1)}}{\partial\vartheta}=\frac{|e|}{m\omega c}\left(\mathbf{E},\frac{\partial f_0}{\partial\mathbf{v}}\right),\\
&a_1=\frac{2\beta(\varepsilon\mu-1)i}{1-\beta^2\varepsilon\mu};\quad a_2=\frac{\varepsilon\mu(1-\beta^2)^2}{(1-\beta^2\varepsilon\mu)^2}+\frac{1}{4}a_1^2;\\
&\omega_H=\frac{|e|H_0}{mc};\quad \Omega_H=\frac{\omega_H}{\omega},
\end{aligned}\right\}\quad(1)$$

$f^{\omega}_{(1)}$ is the deviation of the electron distribution in the plasma from the equilibrium distribution $f_0$; $n_0$ is the plasma density; $\vartheta$ is an angle in the velocity space; $\omega$ is the frequency of the incident waves in the reference system; $H_0$ is a homogeneous constant magnetic field in the z-direction; and $V_0$ is the velocity of the plasma. It is assumed that the plasma fills the semi-space $z > 0$. The boundary conditions are discussed, and with their help, the following system of equation is obtained for the waves of this system instead of (1):

$$\left.\begin{aligned} &\frac{d^2E_{\pm}^{\omega}}{dz^2}+a_1\frac{dE_{\pm}^{\omega}}{dz}+a_2E_{\pm}^{\omega}=\int\limits_0^{\infty}dz'E_{\pm}^{\omega}(z')\left(K_{\pm}(|z-z'|)+pK_{\pm}(|z+z'|)\right),\\ &iK_{\pm}(|\xi|)=\frac{\omega_0^2\pi^{-1/2}\mu(1-\beta^2)}{\omega^2\beta_T(1-\beta^2\varepsilon\mu)}\int\limits_0^{\infty}\frac{dv_{\parallel}}{v_{\parallel}}\exp\left\{-\frac{v_{\parallel}^2}{\beta_T^2}-\frac{i(1\mp\Omega_{\parallel})}{v_{\parallel}}|\xi|\right\},\\ &m\omega_0^2=4\pi n_0e^2.\end{aligned}\right\} \quad (2)$$

For solving this system, a method suggested by I. M. Rapoport (Ref. 11) is discussed. The reflection coefficient is determined from the ratio of the energy fluxes of the reflected and the incident waves:

$$R=\left|\frac{1-m}{1+m}\right|^2,\quad m=\frac{H(0)}{E(0)}\left(\frac{\mu}{\varepsilon}\right)^{3/2} \quad (6).$$



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For m the author obtains the relation

$$m = \frac{i(1-\beta^2\varepsilon\mu)}{(1-\beta^2)\mu}\left\{\alpha + \frac{1}{2\pi}\int_{-\infty}^{+\infty}\ln W(t)\,dt\right\} \quad (7).$$

This relation is discussed for cases in which spatial dispersion is low or strong, and also for the limiting case $(1-\beta^2) \longrightarrow 0$; finally, an expression is given for m, which was obtained from(1) by the Laplace method. From a discussion of the results obtained, the author draws the following conclusions: Within the frequency range where for cold plasma $m_o^2 < 0$ and the reflection coefficient (6) equals unity, the occurrence of a low thermal scattering of the plasma electrons causes a decrease of the reflection coefficient as the result of energy absorption. This absorption mechanism, which was first investigated by L. D. Landau, causes a damping of electromagnetic waves in a plasma with non-zero temperature. The linear dependence of the reflection coefficient on thermal velocity in the case of a symmetric distribution function may be explained by an
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Kinetic theory of the reflection ...

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asymmetry caused by the boundary conditions. With p = 1, this asymmetry vanishes, and the reflection coefficient depends on the square of thermal velocity. Finally, the reflection coefficient for various special cases is discussed. Mention is made of V. S. Tkalich, V. D. Shafranov. The author thanks Ya. B. Faynberg for raising this subject and for his help, G. Ya. Lyubarskiy for his calculations, and A. I. Akhiyezer for discussion. There are 12 references: 8 Soviet-bloc and 4 non-Soviet-bloc.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR, Khar'kov (Institute of Physics and Technology AS UkrSSR, Khar'kov)

SUBMITTED: May 30, 1960



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B109/B207

24.2120 (3717, 3817, 1538)

AUTHORS: Faynberg, Ya. B., Kurilko, V. I., Shapiro, V. D.

TITLE: The character of instabilities in the interaction between charged particle beams and plasma

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 31, no. 6, 1961, 633-639

TEXT: The problem of convective and absolute instabilities is treated by the method of L. D. Landau and Ye. M. Lifshits (Mekhanika sploshnykh sred. GIITL, 1954). In papers by A. I. Akhiyezer, Ya. B. Faynberg (DAN SSSR, 64, 555, 1949; ZhETF, 21, 1262, 1951), D. Bohn, E. Gross (Phys. Rev., 75, 1851, 1949), and G. I. Budker (Atomnaya energiya, I, 5, 1956), the solution of equations for small vibrations was formulated in the form

$$\varphi(\vec{r}, t) = \varphi(y, z)e^{i(kx-\omega t)} \quad (1)$$

with the criterion of instability for the existence of complex roots of the dispersion relation $\Phi(k, \omega) = 0$. The question as to the character of the occurring instabilities remains, however, unsolved. According to Landau and Lifshits, a distinction should be made between convective and

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absolute instabilities; in this connection, the behavior of the integral

$$\int_{-\infty}^{+\infty} \exp\{-i\omega(k)t\}\,dk \qquad (4)$$

plays the decisive role. The study of this integral by the method of Landau and Lifshits, which, for several reasons, is better than that of P. A. Sturrock (Phys. Rev., 112, 1488, 1958), must be carried out for all parts $\omega_\alpha(k)$ of the dispersion relation; for this purpose, the path of integration of (4) is changed according to Fig. 1. The curve C in the $\omega$-plane (Fig. 2) with the integral

$$\int_C e^{-i\omega t} \frac{d\omega}{\frac{d\omega}{dk}} \qquad (5)$$

corresponds to this path of integration. Points of type $\omega_1^*$ do not lie on the examined sheet of the $\omega(k)$ plane; points of type $\omega_2^*$ make no contribution; consequently, (5) takes the form $\int_{\omega_3'} e^{-i\omega t} \frac{d\omega}{\frac{d\omega}{dk}}$, (I). If $t \longrightarrow \infty$, only the range $\omega \sim \omega_3^*$ remains; hence,

$$\frac{d\omega}{dk} \simeq \left[2\frac{d^2\omega}{dk^2}\Big|_{\omega_3^*}(\omega-\omega_3^*)\right]^{1/2},$$

$$\int_{\omega_3^*} e^{-i\omega t}\frac{d\omega}{\frac{d\omega}{dk}} = \frac{2e^{-i\omega_3^* t}}{\left[2i - \frac{d^2\omega}{dk^2}\Big|_{\omega_3^*}\right]^{1/2}}\int_0^\infty e^{-zt}\frac{dz}{\sqrt{z}} = \frac{e^{-i\omega_3^* t}}{\left[\frac{i}{2\pi}\frac{d^2\omega}{dk^2}\Big|_{\omega_3^*} t\right]^{1/2}}. \qquad (6)$$

All other $\omega(k)$ are treated in the same way. Then, a cold plasma (density $n_0$) interacting with a monoenergetic electron beam of density $n_1$ and velocity $V_1$ is considered. After introduction of the usual frictional force $m\nu_{eff}\vec{v}$ $(\nu > 0)$, the dispersion relation acquires the form

$$\frac{1}{X(X+i\nu)} + \frac{a}{(X-Y)(X-Y+i\nu)} = 1, \qquad (II)$$

$$X = \frac{\omega}{\omega_0};\quad Y = \frac{kV_1}{\omega_0};\quad \nu = \frac{\nu_{эфф}}{\omega_0};\quad a = \frac{n_1}{n_0};\quad \omega_{0,1}^2 = \frac{4\pi e^2}{m} n_{0,1}.$$

The points to be surrounded are determined by

$$Y^{\pm}_{per} = \pm \frac{i\nu}{2}\left[\frac{1+\alpha-\frac{\nu^2}{4}}{\alpha-\frac{\nu^2}{4}}\right]^{1/2}$$

$$X^{\pm}_{per} = -i\nu \pm \left[\frac{1+\alpha-\frac{\nu^2}{4}}{\alpha-\frac{\nu_2}{4}}\right]^{1/2} \qquad \text{(III)}$$

(Fig. 3). The points $X^{+}_{per}$, which, together with (6), might lead to an exponential increase of perturbation with time, are meaningless (type $\omega_2^*$); here and also in the case $\nu<0$ the instability is convective (Tak mechanism). At plasma temperatures other than zero, the dispersion relation with the usual notation and simplifying assumptions reads

$$\frac{1}{X^2-\beta^2Y^2}+\frac{a}{(X-Y)^2}=1, \qquad (7);$$

$$\beta V_1=V_T; \quad an_0=n_1; \quad \omega_0 X=\omega; \quad \omega_0 Y=kV_1.$$

if $\beta^2 \ll \alpha \ll 1$, one has

$$X_{per} = \pm\left\{1 + 2\beta\alpha^{1/2}e^{i\pi m} + 2\beta^{3/2}\alpha^{1/4}e^{\frac{i\pi}{2}m}\right\} \quad m = 0, 1, 2, 3.$$

$$Y_{per} = \pm\left\{\alpha^{1/4}e^{\frac{i\pi}{2}m} + \frac{3}{4}\beta^{1/2} + \frac{3}{32}\frac{\beta}{\alpha^{1/4}}e^{-\frac{i\pi}{2}m}\right\} \qquad \text{(IV)},$$

which again results in a convective instability. Small vibrations in a system consisting of two oppositely directed beams of charged particles, are described by the following dispersion relation:

$$\frac{\omega_1^2}{(\omega - kV_1)^2} + \frac{\omega_2^2}{(\omega + kV_2)^2} = 1, \quad \omega_{1,2}^2 = \frac{4\pi e^2}{m} n_{1,2}, \qquad \text{(VII)},$$

where $n_{1,2}$ and $V_{1,2}$ denote the density and velocity of the beams. On the assumption that $V_1 = V_2$ and $n_1 = n_2$, it can be seen that if $t \rightarrow \infty$, (4) increases as $\frac{\exp(\omega_0 t/2)}{\sqrt{t}}$ (non-convective case). The instability is also



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The character of instabilities in the...

non-convective if $n_1 = n_2$, $V_1 - V_2 = \delta(V_1 + V_2)$, and $\delta \ll 1$. The authors thank G. Ya. Lyubarskiy for useful advice. Syrovatskiy is mentioned. There are 6 figures and 7 references: 5 Soviet-bloc and 2 non-Soviet-bloc.

SUBMITTED: July 7, 1960

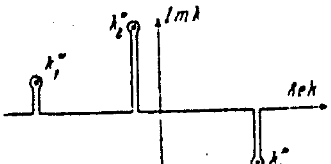


FIG.1

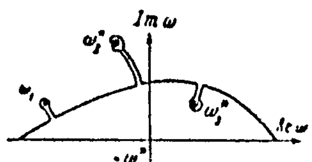


FIG.2

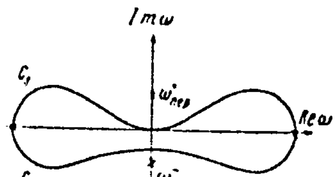


FIG.3

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KURILKO, V.I.

Reflection of electromagnetic waves from a plasma moving in a slow-motion wave-guide. Zhur.tekh.fiz. 31 no.8:899-906 Ag '61. (MIRA 14:8)

1. Fiziko-tekhnicheskiy institut AN USSR, Khar'kov.
(Plasma (Ionized gases)) (Wave guides)
(Electromagnetic waves)

APPROVED FOR RELEASE: 06/19/2000 CIA-RDP86-00513R000927710019-5"

S/781/62/000/000/005/036

AUTHOR: Faynberg, Ya. B., Nekrasov, F. M., Kurilko, V. I.

TITLE: Contribution to the theory of nonlinear longitudinal waves in a plasma

PERIODICAL: Fizika plazmy i problemy upravlyayemogo termoyadernogo sinteza; doklady I konferentsii po fizike plazmy i probleme upravlyayemykh termoyadernykh reaktsiy. Fiz.-tech. inst. AN Ukr. SSR. Kiev, Izd-vo AN Ukr. SSR, 1962, 27-31.

TEXT: The interaction between a beam of charged particles and a plasma is investigated for a specific distribution function, so as to obtain in closed form expressions for the maximum electric field intensity and for the maximum electric field gradient.

It is shown that the maximum field intensity and gradient depend strongly on the form of the distribution function and on the assumptions made concerning the capture of the particles in the potential well formed by the propagating wave, so that the results obtained are only tentative.

The system of equations describing the interaction between the beam and the plasma has

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the form

$$v\frac{\partial f}{\partial x}+\frac{|e|}{m}\cdot\frac{d\varphi}{dx}\cdot\frac{\partial f}{\partial v}=0, \qquad \frac{d^2\varphi}{dx^2}=4\pi|e|\left\{\int f_{\text{плазмы}}\,dv+\int f_{\text{пучка}}\,dv-n_+\right\}, \tag{1}$$

where $n_+$ is the density of the ion background (the ions are assumed stationary). The distribution function chosen for the plasma electron is

$$f(v)=\begin{cases}A_{\text{нез}}\exp\left\{-\frac{m}{2T}\left[\left(\frac{2\varepsilon}{m}\right)^{1/2}+V_\Phi\right]^2\right\} & (v\geq u_0),\\ A_{\text{захв}}\exp\left\{-\frac{m}{2T}\left[\left(\frac{2\varepsilon}{m}\right)^{1/2}-V_\Phi\right]^2\right\} & (|v|<u_0),\\ A_{\text{нез}}\exp\left\{-\frac{m}{2T}\left[\left(\frac{2\varepsilon}{m}\right)^{1/2}-V_\Phi\right]^2\right\} & (v<-u_0),\end{cases} \qquad \frac{mu_0^2}{2}=-|e|\varphi_{\text{мин}}^{\text{пл}}=\frac{mV_\Phi^2}{2}, \tag{2}$$

and for the beam electrons $f(v)=A_0\delta(\varepsilon-\varepsilon_0)$.

In the most interesting case, when the phase velocity is very close to the beam velocity, the maximum field is given by

$$E^2_{\text{макс.макс}} = 4\pi m (V_\phi - V_0)^2 \left\{ n_0 - (n_- - n_3) \frac{V_T}{2\sqrt{\pi} V_\phi} \left( 1 - \frac{V_0}{V_\phi} \right)^2 \right\}. \qquad (5)$$

where $V_0$ is the beam velocity, and $n_-$ and $n_0$ are the densities of the uncaptured plasma particles at the point of zero potential and of the beam at this point.

There are six references. The English-language references are by D. Bohm and E. P. Gross, Phys. Rev. 75, 1851 (1949) and by H. K. Sen, Phys. Rev. 97, 849 (1955).

S/781/62/000/000/007/036

AUTHOR: Faynberg, Ya. B., Gorbatenko, M. F., Kurilko, V. I.

TITLE: Cerenkov radiation in a bounded gyrotropic medium

PERIODICAL: Fizika plazmy i problemy upravlyayemogo termoyadernogo sinteza; doklady I konferentsii po fizike plazmy i probleme upravlyayemykh termoyadernykh reaktsiy. Fiz.-tech. inst. AN Ukr. SSR. Kiev, Izd-vo AN Ukr. SSR, 1962, 34-39.

TEXT: The dispersion properties of a plasma column in a magnetic field differ appreciably from the dispersion properties of an unbounded plasma in a magnetic field, and consequently the interaction between a uniformly moving particle with the fields of a plasma waveguide placed in a magnetic field are of interest. Most previous investigations have dealt with the interaction between a charged particle with electromagnetic waves in unbounded unisotropic and gyrotropic media.

Maxwell's equations in the region occupied by the plasma are solved in straightforward manner, but the expressions are too cumbersome in general, and are interpreted only for

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Cerenkov radiation in a bounded . . . S/781/62/000/000/007/036

several limiting cases.

In the case of zero external magnetic field, the retardation due to the Cerenkov effect turns out to be smaller than that due to polarization losses both in the case of small radii and small densities of the plasma.

It can be shown, however, that when the Cerenkov frequency is much smaller than the polarization frequency, a plasmoid may turn out to be coherent with respect to the Cerenkov radiation and incoherent with respect to the polarization losses, and then the Cerenkov losses may prove larger than the polarization losses if the particle density in the plasmoid is high. The author consequently evaluates the losses in each portion of the spectrum separately, regardless of their relative magnitude.

The conditions under which electronic resonance and ion cyclotron resonance are exicited are also investigated.

There are eight references, of which only the paper by E. Fermi (Phys. Rev. 57, 485, 1940) is in English.

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S/781/62/000/000/027/036

AUTHORS: Faynberg Ya. B., Kurilko, V. I.

TITLE: On adiabatic invariants of a plasma in a magnetic field

SOURCE: Fizika plazmy i problemy upravlyayemogo termoyadernogo sinteza; doklady I konferentsii po fizike plazmy i probleme upravlyayemykh termoyadernykh reaktsiy. Fiz.-tekhn. inst. AN Ukr.SSR., Kiev, Izd-vo AN Ukr. SSR, 1962, 130-132

TEXT: It is demonstrated briefly that an investigation of invariants for a particle moving in a plasma reduces to an investigation of invariants for systems which many degrees of freedom, the theory of which has been developed by Brillouin (ref. 1, The Bohr Atom, 1935) and L. Mandel'shtam (ref. 3, Collected Works, I, 1948). An examination of the behavior of the roots of the dispersion equation shows that the temporal adiabatic invariants for a plasma in a magnetic field do not coincide with the invariants for isolated ions and electrons but tend to them if the plasma density or the wavelength tends to zero. This is also confirmed by physical considerations. A decrease

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in the plasma densiry or in the wavelength corresponds to a decrease in the polarization fields, which are proportional to the charge at half the wavelength, and the presence of which causes a deviation from its natural frequencies from the frequencies of oscillations of isolated ions or electrons. The only other work referred to is H. Alfven's "Cosmical Electrodynamics."

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S/861/62/000/000/021/022
B125/B108

AUTHORS: Faynberg, Ya. B., Kurilko, V. I.

TITLE: On the theory of acceleration by means of the pressure of light

SOURCE: Teoriya i raschet lineynykh uskoriteley, sbornik statey. Fiz.-tekhn. inst. AN USSR. Ed. by T. V. Kukoleva. Moscow, Gosatomizdat, 1962, 326 - 332

TEXT: The radiation of an oscillator produces a pressure that is $\lambda_0^2/(e^2/mc^2)^2$ times as high as that produced by the radiation of a free charge. This is investigated in nonlinear approximation. The motion of a charge in the constant magnetic field $H_z = H_0$ is studied under the action of a plane polarized monochromatic wave $E_x = H_y = E_0 \cos(\omega t - kz)$ propagating along the constant magnetic field. Considering that $\varepsilon \ll 1$ (true in most cases that are important in practice) and $\chi = \frac{2}{3}\frac{l^2}{mc^2\lambda_0} \ll 1$ (true in classical consideration), and allowing for the radiation, the nonlinear equations of

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motion for the particle lead to a slightly nonlinear equation for $u_k = dx_k/ds$, and in the case of steady motion to

$$\left.\begin{aligned} &\vartheta = \operatorname{arctg}\frac{1-b}{\gamma(1+a^2)}, \\ &\frac{1}{4}\frac{\varepsilon^2}{\Omega^2}b^2 = a^2(1-b)^2 + \gamma^2(1+a^2)^2. \end{aligned}\right\} \qquad (6)$$

for amplitude and phase, using the substitution $u_2 = -a\sin(\Omega v+\vartheta)$. For $\vartheta \to 0$ a formula is derived from (6) for $v_\perp/c$ leading to

$$\frac{d}{dt}(p)_z = \frac{e}{c}[v,H]_z = \frac{1}{2}eE_0\beta_\perp\cos\vartheta =$$

$$= \begin{cases} \frac{\varepsilon}{4\gamma}(1-\beta_z)\,eE_0, & \frac{\varepsilon}{2\gamma}(1-\beta_z)^{1/3} \ll 1, \\ \frac{1}{2}(1-\beta_z^2)^{1/3}eE_0 - \frac{\gamma}{8}\ldots, & \frac{\varepsilon}{2\gamma}(1-\beta_z)^{1/3} \gg 1. \end{cases} \qquad (9)$$

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for the radiation pressure. According to these formulas the force of the radiation pressure exerted on the oscillator as averaged over one period cannot exceed $eE_0/2$, and tends toward the value following from the linear theory if $\varepsilon(1-\beta_z)^{1/2} \ll 2\gamma$. These estimates apply if the accuracy of the field is sufficient for a precise resonance. Avoiding the complex equations of interaction, the most important properties of a bunch can be determined from investigating a particle having the mass M=Nm and the charge z=Ne. A bunch and a single oscillator furnish identical results if $N\gamma \ll 1$. With a bunch of that type resonance is achieved even if the field is maintained less accurately. The exact equations of motion considering the radiation pressure, can, by averaging, be reduced to linear Eqs.

$$\left.\begin{aligned}
\frac{\overline{da}}{d\tau} &= (1-\beta_z^2-a^2)^{1/2}\left\{\frac{\varepsilon}{2}(1-\beta_z-a^2)\cos\theta-\gamma a\right\};\\
\frac{\overline{d\beta_z}}{d\tau} &= \frac{\varepsilon a}{2}(1-\beta_z^2-a^2)^{1/2}(1-\beta_z)\cos\theta;\\
\frac{\overline{d\theta}}{d\tau} &= (1-\beta_z^2-a^2)^{1/2}\left\{1-\frac{\Omega(1-\beta_z)}{(1-\beta_z^2-a^2)^{1/2}}+\right.\\
&\qquad\left.+\frac{\varepsilon}{2a}(1-\beta_z)\sin\theta\right\}.
\end{aligned}\right\} \qquad (10)$$

that are not explicitly dependent on time. These considerations apply also when $\varepsilon \gg N\gamma$. This paper was presented to the Uchenyy sovet Fiziko-tekhnicheskogo instituta AN USSR (Scientific Council of the Physicotechnical Institute AS UkrSSR) in November 1956.

KURILKO, V.I.; MIROSHNICHENKO, V.I.

Reflection of electromagnetic waves by a moving plasma. Zhur. tekh.fiz. 32 no.7:803-810 Jl '62. (MIRA 15:8)

1. Fiziko-tekhnicheskiy institut AN USSR, Khar'kov.
(Electromagnetic waves) (Plasma (Ionized gases))

ACCESSION NR: AT4036053 S/2781/63/000/003/0161/0164

AUTHORS: Kurilko, V. I.; Miroshnichenko, V. I.

TITLE: Concerning the instability of high-frequency heating of a plasma

SOURCE: Konferentsiya po fizike plazmy* i problemam upravlyayemogo termoyadernogo sinteza, 3d, Kharkov, 1962. Fizika plazmy* i problemy* upravlyayemogo termoyadernogo sinteza (Plasma physics and problems of controlled thermonuclear synthesis); doklady* konferentsii, no. 3, Kiev, Izd-vo AN UkrSSR, 1963, 161-164

TOPIC TAGS: plasma instability, plasma heating, cyclotron resonance phenomena, ion beam, kinetic gas theory, plasma oscillation, microwave plasma

ABSTRACT: The stability of an ion cyclotron wave in a plasma is considered, with the analysis limited to a wave propagating along

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ACCESSION NR: AT4036053

constant magnetic fields. From the dispersion equation for the longitudinal plasma oscillations transversely to the magnetic field, excited by an ion beam, it is found by a kinetic analysis that high-frequency instabilities occur in such a plasma and the growth increments are determined. In addition, instabilities with characteristic times which are much longer than the period of the high-frequency wave can be developed during propagation of an ion cyclotron wave in the plasma. The growth increment for such instabilities is also determined. "In conclusion the author thanks Ya. B. Faynberg for suggesting the topic and help in the work, and V. D. Shapiro for valuable discussions. Orig. art. has: 5 formulas.

ASSOCIATION: None

SUBMITTED: 00 DATE ACQ: 21May64 ENCL: 00

SUB CODE: ME NR REF SOV: 007 OTHER: 002

Card 2/2

... plasma wave ...

... plasma wave ... plate ...

... this wave is scattering ... of the ...

... stant is calculated ... separation sur-

... perfectly conducting ... and the re-

... are used to determine ... wave from

AP4048,

... of a plasma wave ...
... absence of a magnetic field, ...
... dispersion, the reflection ... be almost
independent of the boundary conditions on the end of the waveguide.
In the presence of a strong magnetic field, the dependence on the
boundary conditions makes it impossible to obtain an exact solution.
... general case the solution can be obtained only by numerical
... asymp...

... authors thank ...

... art. ...

...ATION: Khar'kovskiy gosudarstvennyy universitet (Khar'kov
...versity)

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... CODE: EC NR REF SOV: ... OTHER: 002

2/2

APPROVED FOR RELEASE: 06/19/2000 CIA-RDP86-00513R000927710019-5"

Krasovy*ts'ky*y, V. ... ...lko, V. I.

TITLE: An accelerating system with drift tubes on superhigh frequency

SOURCE: Ukrayins'ky*y fizy*chny*y zhurnal, v. 9, no. 10, 1964, 1134-1136

TOPIC TAGS: drift tube, cylindrical diffraction grating

ABSTRACT: To make best use of the very intense electric fields which ... obtained by means of lasers for accelerating charged particles, it is necessary to have a system of waveguides for the visible range ... A cylindrical ... equivalent ... cylindrical diffraction grating made of infinitely thin rings whose width was equal to half the grating period. It is shown that waves whose length approximately equals the period of grating can be excited, and if the system is filled with a dielectric whose dielectric constant is close

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ACCESSION NR: AP4048868

... ity, the field can be focused in the ... the axis of ... stem. It is also shown that ...

... system. The author thanks Ya. B. Faynberg for selected topics and evaluation of results and O. I. Akhiyezer for valuable discussions." Orig. art. has: 10 formulas.

ASSOCIATION: Fizy*ko-tekhnichny*y institut AN UkrSSR (Physico-technical Institute, AN UkrSSR)

SUBMITTED: 02Apr64 ENCL: ... SUB CODE: ... NR. EC

NO REF SOV: 004 OTHER: 001 ATD PRESS: 3135

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ACCESSION NR: AP4040324 S/0057/64/034/006/1136/1138

AUTHOR: Gorbatenko, M.F.; Kurilko, V.I.

TITLE: Contribution to the kinetic theory of surface waves in a plasma (Letter to the editor)

SOURCE: Zhurnal tekhnicheskoy fiziki, v.34, no.6, 1964, 1136-1138

TOPIC TAGS: plasma, surface wave, plasma physics, plasma wave propagation

ABSTRACT: The dispersion equation is derived for the propagation of surface waves at the boundary between a plasma and the vacuum, for the case that the electron temperature is small but not zero. Maxwell's equations and the kinetic equation for small deviations of the electron distribution function from the Maxwellian form are subjected to a Laplace transformation with respect to the coordinate perpendicular to the plasma-vacuum surface. The collision integral and the kinetic pressure of the electrons are neglected. The impedance of the plasma is calculated and the dispersion equation is derived by equating this to the impedance of the vacuum. The resulting dispersion equation reduces to that discussed by Ya.B.Faynberg and M.F. Gorbatenko (ZhTF 29,546,1959) for vanishing electron temperature. The damping cons-

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ACCESSION NR: AP4040324

tant is found to be proportional to the thermal velocity of the electrons. This damping is said to be a result of Cherenkov absorption of the energy of the waves by the thermal electrons of the plasma, and the slower waves, with which the electrons can interact, are said to represent the short wavelength Fourier components of the field of the surface waves in the plasma. "In conclusion we take the occasion to express our sincere gratitude to Ya.B.Faynberg for suggesting the topic and for valuable discussions." Orig.art.has: 12 formulas.

ASSOCIATION: none

SUBMITTED: 03Jun63 DATE ACQ: 19Jun64 ENCL: 00

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

Card2/2

APPROVED FOR RELEASE: 06/19/2000 CIA-RDP86-00513R000927710019-5"

KALMYKOVA, S.S.; KURILKO, V.I.

Diffraction of a surface wave on an ideally conducting wedge.
Dokl. AN SSSR. 154 no.5:1066-1068 F'64. (MIRA 17:2)

1. Khar'kovskiy gosudarstvennyy universitet. Predstavleno akademikom M.A. Leontovichem.

KURILKO, V.I.

Theory of magnetohydrodynamic wave scattering at the outlet of a wave guide. Mag. gidr. no.3:44-50 '65.

(MIRA 18:10)

KALMYKOVA, S.S.; KURILKO, V.I.

Excitation of a magnetohydrodynamic wave guide by a coaxial one. Mag. gidr. no.3:51-53 '65. (MIRA 18:10)

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a longitudinal wave with the same phase velocity. The problem of excitation of a two-level system by an electron beam is studied and it is shown that if the condition for the anomalous Doppler effect is satisfied, then the system can be transformed to the inverted state. Coupled nonstationary longitudinal-transverse oscillations in the system made up of the beam and the active medium [illegible]

L 11059-66 EWT(d)/EWT(l)/T/EWA(m)-2/EWP(l) IJP(c) AT

ACC NR: AP6002724 SOURCE CODE: UR/0056/65/049/006/1831/1835

AUTHOR: Krasovitskiy, V. B.; Kurilko, V. I.

63
B

ORG: Physicotechnical Institute, Academy of Sciences Ukrainian SSR (Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR)

TITLE: Nonlinear theory of beam instability under conditions of the anomalous Doppler effect

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 6, 1965, 1831-1835

TOPIC TAGS: plasma wave absorption, plasma wave propagation, particle beam, Doppler effect

ABSTRACT: The hydrodynamic approximation is used in an analysis of the excitation of one-dimensional transverse waves by an electron beam propagated in a plasma with a velocity greater than the phase velocity of the wave. Solutions in the form of waves with a fixed wave number and time varying amplitude and phase are analyzed. It is shown that in the case of small beam densities the main nonlinear effect restricting an increase of the oscillation amplitude is the violation of synchronism between the particles and field as a result of deceleration of the beam; this results in a periodic alternation of excitation and absorption of the field by the beam. The maximal oscillation amplitudes are calculated. The possibility of using this effect for re-

L 11059-66

ACC NR: AP6002724

moval of beam instabilities by an external field are discussed. Orig. art. has: 9 formulas. [CS]

SUB CODE: 20 / SUBM DATE: 02Jun65/ ORIG REF: 007/ ATD PRESS: 4171

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L 4242-66 EWT(1)/EWT(m)/ETC/EPF(n)-2/EWG(m)/EPA(w)-2/EWA(m)-2 IJP(c) GS/AT/JXT

ACCESSION NR: AT5007973 S/0000/64/000/000/1023/1029

AUTHOR: Berezin, A. K.; Berezina, G. P.; Bolotin, L. I.; Gorbatenko, M. F.; Yegorov, A. M.; Zagorodnov, O. G.; Kornilov, B. A.; Kurilko, V. I.; Lutsenko, Ye. I.; Laypkalo, Yu. M.; Pedenko, N. S.; Kharchenko, I. F.; Shapiro, V. D.; Shevchenko, V. I.; Faynberg, Ya. B.

TITLE: Acceleration of charged particles with the aid of longitudinal waves in plasma and plasma waveguides

SOURCE: International Conference on High Energy Accelerators. Dubna, 1963. Trudy. Moscow, Atomizdat, 1964, 1023-1029

TOPIC TAGS: high energy accelerator, electron beam, plasma accelerator, plasma waveguide

ABSTRACT: Plasma waveguides and noncompensated electron and ion beams can be utilized as accelerating systems in linear accelerators (Faynberg, Ya. B., Symposium CERN 1, 84 1956); *Atomnaya energiya* 6, 431 (1959)). In such systems, slow electromagnetic waves $v_\phi \leq c$ are propatated, which are necessary for particle acceleration. The waveguide properties of restrained plasma and noncompensated beams are displayed in the case of waves in the meter and centimeter range even for com-

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ACCESSION NR: AT5007973

paratively small plasma densities around $10^9$ to $10^{13}$ $cm^{-3}$). Under these conditions the high-frequency energy losses during wave propagation, which are due to the collisions of plasma particles, are small. The density of electrons in metals (about $10^{23}$) is many orders greater than is necessary for ensuring waveguide properties in the microwave range. This leads to great losses of high-frequency power during wave propagation in metallic conductors. For plasma densities around $10^9$ to $10^{13}$ $cm^{-3}$, the energy losses during particle transist through the plasma, which are proportional to plasma density, are insignificant, from $10^{-5}$ to $10^{-6}$ ev/cm. This means that plasma waveguides are "transparent" for accelerated particles. According to the conditions of acceleration the particles are divided into individual bunches. Thus the loss of particles moving in the plasma can increase greatly because of the occurrence of coherent deceleration representing the inverse of the effect of coherent acceleration, which was established by V. I. Veksler (Symposium CERN 1, 80 (1956)). However, even for accelerated particle fluxes of the order of tens of amperes, these losses are all insignificant. Because waveguide properties are determined by the plasma, the metal surfaces can be remote from regions with large field strengths or eliminated altogether, which permits a significant increase in the permissible voltages of the accelerating fields and a substantial de-

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ACCESSION NR: AT5007973

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crease in the high-frequency energy losses. It is also important to concentrate the electromagnetic energy in the radial direction only in the regions where the accelerated particles are moving. Thus for a given field strength the electromagnetic energy flux decreases markedly. If the fluxes of accelerated particles are large, the waveguide properties necessary for acceleration can be ensured by the particles of the beam which are not entrapped in the acceleration process, through which particles the entrapped particles move. The beam itself which is injected into the accelerator operates under these conditions of an accelerating system. To clarify the possibilities of particle acceleration by means of electromagnetic waves excited by charged particle beams, and also to investigate the influence of beam instabilities upon the acceleration process, the Physicotechnical Institute, Academy of Sciences Ukrainian SSR conducted theoretical and experimental investigations on the interaction of charged particle beams with a plasma. These investigations were intended to lead to, not the design and construction of a definite accelerator model, but the physical processes occurring during the interaction under consideration, and in this way to a determination of the possibilities of plasma methods of acceleration which are being developed at this institute. The theory developed up to the present time of the interaction between beams and plasma has been essentially a linear theory. As a result of the work of V. D. Shapiro and V.

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ACCESSION NR: AT5007973

I. Shevchenko at this institute for the case of beams of not very large density, a nonlinear theory has been created which permits one to trace the process of interaction of an initially nonmodulated beam and mono-energetic beam with a plasma from the initial stage to saturation. As is shown, a large part of the beam's energy of ordered motion (75% of its initial energy) is lost by the beam as a result of collective interactions with the plasma. Thus the energy expended upon excitation of oscillations amounts to 30%; upon increasing the thermal energy of the plasma, to 30%; and upon increasing the thermal energy of beam, to 15%. The experimental investigations of this interaction were carried out by I. F. Kharchenko and A. K. Berezin and their respective co-workers. Their results are in agreement with the theory of M. F. Gorbatenko. The mentioned institute has also carried out further theoretical and experimental investigations on the problems of electromagnetic wave propagation in plasma waveguides excited by high-frequency wall sources. The experimental studies, by O. G. Zagorodnov, et al., showed that the results agree well with theory under conditions of insignificant nonlinear effects. Current experiments are concerned with highly-ionized plasmas with density $10^{11}$ to $10^{12}$. Orig. art. has: 4 figures, 1 table.

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L 4242-66

ACCESSION NR: AT5007973

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UkrSSR (Physicotechnical Institute, AN UkrSSR)

SUBMITTED: 26May64 ENCL: 00 SUB CODE: NP

NO REF SOV: 005 OTHER: 001

Card 5/5

L 14240-66 EWT(1)/EWP(m)/T... IJP(c)
ACC NR: AP5024899 UR/0382/65/000/003/0044/0050

18
B

AUTHOR: Kurilko, V.I.

ORG: None

TITLE: Scattering of magnetohydrodynamic waves at the end of a waveguide

SOURCE: Magnitnaya gidrodinamika, no. 3, 1965, 44-50

TOPIC TAGS: magnetohydrodynamic theory, magnetohydrodynamic wave, magnetohydrodynamic waveguide

1,55

ABSTRACT: The paper deals with magnetohydrodynamic wave scattering at the open end of a semiinfinite plasma waveguide. The specific problem is that of wave scattering at the end of a waveguide terminated by a conductive diaphragm. An infinite, zero temperature plasma is assumed. In this case, the plasma-filled waveguide can be regarded as a special case of an anisotropic dielectric waveguide. Scattering of electromagnetic waves is then studied at the step changes in the dielectric constant, for an anisotropic dielectric waveguide with piecewise uniform parts divided by conductive diaphragms. The solution is shown to be given by a Fredholm integral equation of the second kind, known to possess a unique solution and amenable to a computer approach. In many practical cases, the inequality (1) holds, and an analytical solution is possible. This is

$$\delta \ll a \ll \lambda \qquad (1)$$

($\delta$ - depth of skin layer; a - waveguide radius; $\lambda$ - wavelength)

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L 1420-66

ACC NR: AP5024899

determined in form of a set of expressions for the coefficients $R_{l,m}$ of mutual transformation in scattering, $R_{l,m}$ being the amplitude of wave number $l$, generated in the waveguide at the scattering of wave number $m$. The sets are valid for various limits assumed on the problem parameters, such as e.g. the expressions in (16d)

$$R_{lm}=\frac{\nu_m}{\nu_l^2(\nu_l+\nu_m)\,e_\perp}\;\frac{\ln\frac{\lambda a}{\delta^2\nu_l\nu_m}\ln\frac{\lambda}{a}+\ln\frac{\lambda}{\delta\nu_l}\ln\frac{\lambda}{\delta\nu_m}}{\ln\frac{\lambda}{a}\ln^2\frac{\lambda}{a\nu_l}},\qquad(16d)$$

$$a\ll\delta\nu_{l,m}\ll\lambda,\quad J_1(\nu_{l,m})\simeq 0.$$

It can be seen, that with an increase of wave number, and with a decrease of the magnetic field strength, the coefficients of mutual transformation of magnetohydrodynamic waves in the waveguide decrease. Orig. art. has 16 formulas.

SUB CODE: 20 SUBM DATE: 26Nov64/ ORIG REF: 005 OTH REF: 003

Card 2/2

L 14225-66 EWP(m)/EWT(1)/EWA(d)/ETC(m)-6/EWA(1) WW

ACC NR: AP5024900 UR/0382/65/000/003/0051/0053

AUTHOR: Kalmykova, S.S.; Kurilko, V.I.

ORG: None

18

B

TITLE: Excitation of a magnetohydrodynamic waveguide by a coaxial one.

SOURCE: Magnitnaya gidrodinamika, no. 3, 1965, 51-53

TOPIC TAGS: magnetohydrodynamic theory, magnetohydrodynamic waveguide

ABSTRACT: The matching of a cylindrical coaxial waveguide with an (inner) semiinfinite magnetohydrodynamic plasma waveguide is studied. Of particular interest is the excitement of the axially symmetric E-wave in the magnetohydrodynamic waveguide by the TEM wave of the coaxial cable. The plasma waveguide serves as a continuation of the inner tube of the coaxial cable; low magnetohydrodynamic frequencies ($\omega \ll \omega_{ci}$, where $\omega_{ci}$ is the gyrofrequency of the ions) are postulated. The arrangement is shown in Fig. 1. The assumptions made permit to reduce the exact problem of finding the Fourier components to a solution of a Fredholm integral equation of the second kind. For high plasma densities, ($\omega_0^2 a^2 \gg c^2$), the equation can be conviniently solved by an iterative process. Under various assumed limits and relative magnitudes of the problem parameters, formulas for the reflection factor of the exciting coaxial waves, (1) and (2),

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and several expressions for the amplitude ratios of the excited waves, $T_n$, are obtained, expressions (3), (4), (5) and (6).

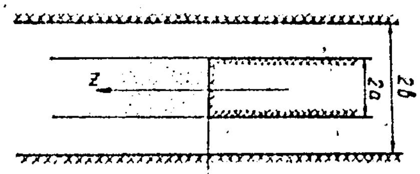


FIG.1.

$$R = -\frac{\delta}{2a \ln b/a}\left[1 - \frac{2}{3}(\varepsilon_\perp - 1)^{1/2}\right]; \quad \varepsilon_\perp - 1 \ll 1 \quad (1)$$

$$\delta = c/\omega_0;$$

$$R = -\frac{\delta}{3a\varepsilon_\perp \ln b/a}. \quad \varepsilon_\perp \gg 1. \quad (2)$$

$$T_n = \frac{2}{\ln b/a}[\lambda_n^2 + \ln^{-2} b/a]^{-1}; \quad \varepsilon_\perp - 1 \ll \frac{\lambda_n^2\delta^2}{a^2} \ll 1. \quad J_1(\lambda_n) = 0 \quad (3)$$

$$T_n = \frac{2}{\lambda_n^2 \varepsilon_\perp \ln b/a}\left[\frac{\lambda_n^2\delta^2}{a^2}\right]^2; \quad \frac{\lambda_n^2\delta^2}{a^2} \ll 1 \ll \varepsilon_\perp, \quad J_1(\lambda_n) \simeq 0 \quad (4)$$

$$T_n = \frac{2}{\lambda_n^2 \varepsilon_\perp \ln b/a}; \quad a^2 \ll \lambda_n^2\delta^2 \ll \lambda^2. \quad (5)$$

$$\left.\begin{array}{l} T_n = \dfrac{2}{\lambda_n^2 \ln b/a}\left[\dfrac{\lambda_n^2\delta^2}{a^2(\varepsilon_\perp - 1)}\right]^2; \\ \dfrac{\delta^2\lambda_n^2}{a^2} \ll \varepsilon_\perp - 1 \ll 1, \quad J_1(\lambda_n) \simeq 0; \end{array}\right\} \quad (6)$$

Dependence of these coefficients upon the magnetic field is discussed. Orig. art. has 1 fig., 9 formulas.

SUB CODE: 20 SUBM DATE: 04Jan65/ ORIG REF: 002 Oth REF: 000

L 14961-66 EPF(n)-2/EWT(1)/ETC(f)/EWG(m) IJP(c) AT
ACC NR: AP6002466

SOURCE CODE: UR/0386/65/002/011/0511/0514

AUTHOR: Roulends, Dzh.; Krasovitskiy, V. B.; Kurilko, V. I.

71
68
B

ORG: [Roulends] UKAEA, Culham lab. Culham, Abingdon, Berks; [Krasovitskiy, Kurilko] FTI AN UkrSSR, Khar'kov

TITLE: Stability in phased oscillators

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 2, no. 11, 1965, 511-514

TOPIC TAGS: magnetohydrodynamics, harmonic oscillator, MHD instability, Maxwell equation, hydrodynamics

ABSTRACT: The authors consider the problem of stability in a system of phased oscillators, i. e. oscillators whose phase is fixed in velocity space. This type of a system may arise when a transverse electromagnetic wave is propagated in a plasma along the magnetic field. In this case, the problem of stability in the system of phased oscillators and in the waves propagating in the plasma are completely identical. This problem is studied in the hydrodynamic approximation. The initial system of equations consists of hydrodynamic equations for the plasma particles and

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L 14961-66
ACC NR: AP6002466

Maxwell equations. It is assumed that the amplitudes of the velocity and the fields are constant and formulas are given showing the relationships between them. Qualitative analysis shows that there are always frequencies corresponding to instability when the amplitude of the field is large enough. The simplest limiting cases are examined for a quantitative evaluation of increments and instability conditions. In the case of a rare plasma (strong magnetic field) instability may exist only in the fast wave region. An increase in the amplitude of the wave results in a wider instability region (with respect to frequency), as well as an increase in the increment of instability. Instability shows up as the threshold type in the case of a dense plasma (weak magnetic fields). The results are compared with previous studies. The authors thank Ya. B. Faynberg for discussion of the results of this work. One of the authors (R. Dzh.) thanks GKIAE SSSR, and also the director of the FTI AN UkrSSR for his hospitality. Orig. art. has: 7 formulas.

SUB CODE: 09 SUBM DATE: 19Oct65/ ORIG REF: 002/ OTH REF: 000

Card 2/2 JO

KRASOVITSKIY, V.B.; KURILKO, V.I.

Nonlinear theory of beam instability under conditions of the anomalous Doppler effect. Zhur.eksp. i teor.fiz. 49 no.6: 1831-1835 D '65. (MIRA 19:1)

1. Fiziko-tekhnicheskiy institut AN UkrSSR. Submitted June 2, 1965.

L 18891-66 EWT(1) GG

ACC NR: AP6007097 UR/0057/66/036/002/0401/0404

AUTHOR: Krasovitskiy, V.B.; Kurilko, V.I.

ORG: None

35
34
B

TITLE: Interaction of electromagnetic waves with a two-level system

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 2, 1966, 401-404

TOPIC TAGS: electromagnetic wave absorption, electromagnetic wave reflection, nonlinear theory, nonlinear effect, nonlinear focusing effect

21, 44, 55

ABSTRACT: The authors discuss the interaction of electromagnetic waves of frequency f with a nonlinear medium characterized by a single resonant frequency F and the following relation between the polarization P and the electric vector E:

$$P = \pm kE/(1 - k^2E^2)^{1/2}, \text{ with } k = 2Nd^2F/hf|F - f|.$$

Here N is the density of active molecules, d is the dipole moment of a molecule, h is Planck's constant and P and E are measured in units of Nd. A half-space with a plane boundary filled with the nonlinear medium is discussed and formulas are derived for the reflection and transmission coefficients when F exceeds f and for the nonlinear input impedance of the medium when f exceeds F. In

Card 1/2 UDC: 538.56

L 18391-66

ACC NR: AP6007097

the one case the transparency of the medium increases, and in the other case the input impedance decreases with increasing amplitude of the wave. It is shown that when f exceeds F the nonlinear dependence of the polarizability on the field strength can give rise to focusing of the electromagnetic wave. An equation valid when k is small is derived for the linear dimensions of the region in which the field is focused. "The authors thank Ya.B.Faynberg for suggesting the topic and for valuable discussions." Orig. art. has: 14 formulas. [15]

SUB CODE: 20/ SUBM DATE: 05Jun65/ ORIG REF: 006/ OTH REF: 003
ATD PRESS: 4217

Card 2/2 mc

L 25502-66 EPF(n)-2/EWT(1)/ETC(f)/EWG(m) IJP(c) AT

ACC NR: AF6011391 SOURCE CODE: UR/0057/66/036/003/0466/0469

AUTHOR: Kurilko, V.I.; Popov, V.A.

ORG: Khar'kov State University im. A.M.Gor'kiy (Khar'kovskiy gosudarstvennyy universitet)

TITLE: On the kinetic theory of excitation of longitudinal waves in a bounded plasma

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 3, 1966, 466-469

TOPIC TAGS: plasma wave, plasma oscillation, longitudinal wave, kinetic equation, electron reflection

ABSTRACT: The authors employ the kinetic equation for small deviations of the electron distribution function from the Maxwellian form to discuss excitation in a plasma with a plane boundary of longitudinal waves by an oscillating electric field perpendicular to the boundary. As the boundary condition it is assumed that the fraction p of the plasma electrons that strike the boundary are specularly reflected and the fraction 1 - p of them are diffusely reflected. From the kinetic equation and this boundary condition there is derived an integral equation for the field. For the case p = 1 this integral equation was derived and its solution discussed by L.D.Landau (ZhETF, 16, 574, 1947); in the present paper the integral equation is treated for general values of p with the aid of techniques described elsewhere by

Card 1/2 UDC: 533.9

L 25502-66

ACC NR: AP6011391

V.I.Kurilko and V.I.Miroshnichenko (Ukr.fiz.zh. 6, No. 4, 1961); ZhTF, 33, 803, 1963). For the case p = 0 the calculations are carried through to the end and expressions are derived for the distribution of the field near the plasma boundary. It is found that in this case there is formed a surface charge at the plasma boundary, as a result of which the field distribution for frequencies near the plasma frequency is significantly different from the distribution obtained by Landau (loc.cit.) for the case p = 1. Orig. art. has: 14 formulas.

SUB CODE: 20 SUBM DATE: 10Mar65 ORIG. REF: 010

Card 2/2

ACC NR: AP6031438 SOURCE CODE: UR/0056/66/051/002/0445/0448

AUTHOR: Krasovitskiy, V. B.; Kurilko, V. I.

ORG: Physicotechnical Institute of the Academy of Sciences, Ukrainian SSR (Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR)

TITLE: On the theory of the amplification of longitudinal waves by a beam of charged particles in a nonlinear plasma

SOURCE: Zh eksper i teor fiz, v. 51, no. 2, 1966, 445-448

TOPIC TAGS: nonlinear plasma, longitudinal wave, plasma wave

ABSTRACT: An investigation was made of the amplification of a monochromatic longitudinal wave by a beam of charged particles in a nonlinear plasma described by the dielectric constant $\varepsilon \equiv 1 - \omega p^2/\omega^2 \exp(-E^2/Eo^2)$ (E is the amplitude of the excited field). It was found that for a sufficiently high beam density the back effect of the excited oscillations on the motion of the beam particles can be neglected, at least in the vicinity of plasma resonance ($|\omega - \omega p| \ll \omega p$). The maximum amplitude of the amplified wave was found and the dependence of the amplitude on the coordinate was determined. It is emphasized that the energy of the beam particles at the output from the plasma layer can be higher than the injection energy. Orig. art. has: 8 formulas. [JA]

SUB CODE: 20/ SUBM DATE: 05Jan66/ ORIG REF: 009/ OTH REF: 002/ ATD PRESS: 5082

Card 1/1

L 07400-67 EWT(1) GD/GW
ACC NR: AT6020584 (N) SOURCE CODE: UR/0000/65/000/000/0205/0208

AUTHOR: Krasovitskiy, V. B.; Kurilko, V. I.

ORG: none

33
B+1

TITLE: On the deceleration of relativistic particles in lower layers of the atmosphere

SOURCE: AN UkrSSR. Vysokochastotnyye svoystva plazmy (High frequency properties of plasma). Kiev, Naukovo dumka, 1965, 205-208

TOPIC TAGS: atmospheric radiation, relativistic particle, Cerenkov radiation, bremsstrahlung, atmospheric model

ABSTRACT: The deceleration of charged relativistic particles in the atmosphere is investigated. The deceleration in the medium is due to energy loss by radiation which is computed on the assumption of a specific model of the atmosphere (isotropic dielectric with a certain dispersion). Three spectral regions are investigated. It is shown that for low particle energy the bremsstrahlung increases as four-thirds power of energy. At moderate energies (conditions), the maximum radiation occurs at a frequency proportional to the reciprocal of energy and the power loss of a particle is inversely proportional to the square of its energy. As the energy of the particle increases further a more complicated dependence on the energy is found to occur. Also, the spectral peak dependence is different than at lower energies. The Cerenkov radiation for the

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L 07400-67

ACC NR: AT6020584

case considered in this work is always greater than bremsstrahlung when it is necessary to consider the effect of the medium on particle energy. Orig. art. has: 7 formulas.

SUB CODE: 20,04/ SUBM DATE: 19Nov65/ ORIG REF: 007/ OTH REF: 002

Card 2/2

L 08811-67 EWT(1) GG/GD

ACC NR: AT6020437 (N) SOURCE CODE: UR/0000/65/000/000/0062/0068

AUTHOR: Krasovitskiy, V. B.; Kurilko, V. I. 42

ORG: none

TITLE: Excitation and propagation of electromagnetic waves in a two-level system

SOURCE: AN UkrSSR. Vzaimodeystviye puchkov zaryazhennykh chastits s plazmoy (Interaction of charged particle beams with plasma). Kiev, Naukova dumka, 1965, 62-68

TOPIC TAGS: electromagnetic wave generation, motion equation, electromagnetic wave propagation, charged particle

ABSTRACT: The interaction of a compensated uniform beam of charged particles with non-linear medium is considered. The property of the medium is described by a semi-classical theory where the polarization vector is determined in terms of quantum mechanics and the electric and magnetic fields follow the classic description. It is assumed that the medium has two energy states and that dissipation effects are neglected. The system is described by Maxwell equations, and by equations describing the active medium. Analysis of these equations indicates that in the case of large amplitude waves, periodic pumping of the energy of longitudinal oscillations into the internal energy of the medium occurs. This leads to an inverted energy state population, the duration of which is computed. In this case, the period of oscillations increases logarithmically

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L 08811-67

ACC NR: AT6020437

with decreasing initial amplitude of the oscillations. Development of small transverse oscillations also is considered; here it is shown that the influence of the medium on transverse propagation weakens as the wave amplitude increases. As the oscillations become very intense, the level populations are modulated with double the frequency of transverse oscillations. Orig. art. has: 16 formulas.

SUB CODE: 20/ SUBM DATE: 11Nov65/ ORIG REF: 005/ OTH REF: 003

Card 2/2 nst

L 08801-67 EWT(1)/EWP(m) IJP(c) GD

ACC NR: AT6020570 (N) SOURCE CODE: UR/0000/65/000/000/0098/0100

75

AUTHOR: Kalmykova, S. S.; Kurilko, V. I.

ORG: none

TITLE: Excitation of a magnetohydrodynamic waveguide by a coaxial waveguide

SOURCE: AN UkrSSR. Vysokochastotnyye svoystva plazmy (High frequency properties of plasma). Kiev, Naukovo dumka, 1965, 98-100

TOPIC TAGS: MHD, waveguide, coaxial waveguide, plasma density, strong magnetic field

ABSTRACT: The generation of an axially symmetric *E*-wave in an MHD waveguide by a coaxial waveguide is discussed. Plasma temperature is neglected, allowing the use of a tensor for the dielectric without spatial dispersion. Electric and magnetic field equations are derived and a reflection coefficient at the boundary adjoining the two waveguides is derived for the case of a dense plasma. It is pointed out that in computing the amplitude of the waves in the MHD waveguide, four different regimes are observed. For each one of these, the amplitude of the magnetic field is derived. These results show that the waves can be excited effectively by a coaxial waveguide only in the presence of sufficiently strong magnetic fields. In the case of low fields, only surface waves are excited. In intermediate cases, some high harmonics are weakly excited. Orig. art. has: 5 formulas.

SUB CODE: 20/ SUBM DATE: 19Nov65/ ORIG REF: 003

Card 1/1 nst

L 08802-67 EWT(1)/EWP(m) IJP(c) GD SOURCE CODE: UR/0000/65/000/000/0100/0109

ACC NR: AT6020571

AUTHOR: Kurilko, V. I.

ORG: none

TITLE: On the theory of the propagation of magnetohydrodynamic waves at the end of a waveguide

SOURCE: AN UkrSSR. Vysokochastotnyye svoystva plazmy (High frequency properties of plasma). Kiev, Naukovo dumka, 1965, 100-109

TOPIC TAGS: plasma waveguide, wave number, plasma magnetic field, plasma wave propagation

ABSTRACT: A semi-infinite plasma waveguide is studied in order to illuminate the propagation of the waves near the ends of experimental waveguides filled with plasma. The derivation of the field equations is shown to lead to two coupled integral equations, which for the case considered, are reduced to a coupled system of an infinite number of algebraic equations. The plasma waveguide considered for this problem is assumed to have infinite conductivity and zero temperature. In the presence of a small parameter arising from the small diameter of the waveguide (relative to wavelength), the Fourier components can be obtained analytically. This allows derivation of the behavior of the waves at the end; their transformation and reflection coefficients are ob-

L 08802-67

ACC NR: AT6020571

tained. It is seen that the coefficients of mutual transformation of high harmonics decrease with the increase in the work number and with a decreasing magnetic field. Orig. art. has: 19 figures.

SUB CODE: 20/ SUBM DATE: 19Nov65/ ORIG REF: 005/ OTH REF: 002

Card 2/2 nst

ACC NR: AP7001322 SOURCE CODE: UR/0057/66/036/012/2210/2212

AUTHOR: Krasovitskiy, V. B.; Kurilko, V. I.

ORG: none

TITLE: Oscillator acceleration by laser emission

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 12, 1966, 2210-2212

TOPIC TAGS: oscillator acceleration, particle acceleration, laser beam ~~particle acceleration~~ laser emission, laser application

ABSTRACT: An analytical investigation was made of the possibility of using laser emission as a means for amplifying particle energy. The laser beam was considered a superposition of a large number of various oscillations of close frequencies and random phases. The analysis shows that the principles of particle acceleration by a resonant field are also valid, under certain circumstances, in the case of a laser beam despite the beam's wave phase differences and deviations from pure monochromatism. The required condition for acceleration is an appropriate pulse duration, which should not exceed a certain critical value. Pulse duration above the critical leads to a reduction of the acceleration rate. The acceleration effect is said to stem mainly from the resonant harmonics of the field, which are most effectively absorbed by



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ACC NR: AP7001322

the oscillator. The authors thank Ya. B. Faynberg for suggesting the topic and for discussing the results. Orig. art. has: 9 formulas.
[WA-14]

SUB CODE: 20/ SUBM DATE: 22Jul66/ ORIG REF: 006

Card 2/2

ACC NR: AR7000891 SOURCE CODE: UR/0058/66/000/009/H033/H033

AUTHOR: Kalmykova, S. S.; Kurilko, V. I.

TITLE: Theory of electromagnetic wave scattering on an inhomogeneity in a dielectric waveguide

SOURCE: Ref. zh. Fizika, Abs. 9Zh241

REF SOURCE: Radiotekhnika. Resp. mezhved. nauchno-tekhn. sb., vyp. 1, 1965, 165-171

TOPIC TAGS: dielectric waveguide, electromagnetic wave scattering, waveguide, plasma waveguide

ABSTRACT: The problem of scattering of an axially symmetrical E-type surface wave of a dielectric anisotropic waveguide on an inhomogeneity represented by a sudden variation of the dielectric constant tensor is solved. At the point of sudden variation, the homogeneous sectors of the waveguide are divided by an infinitely thin, ideally conductive diaphragm. Starting from Maxwell equations, the authors write expressions for field vectors of the surface wave inside and outside of the waveguide which, in addition to known values, include also integral terms

ACC NR: AR7000891

corresponding to the superposition of an infinite plane wave spectrum. The superposition of boundary conditions on the waveguide surface and on the diaphragm makes it possible to formulate the boundary value problem for the determination of plane wave amplitudes. This problem is reduced to the Fredholm integral equation which in a general case can be solved numerically, or in the presence of a small parameter, analytically. The results obtained are applied to analysis of the matching of a plasma waveguide with a coaxial line without allowance for gyrotropy, i. e., under the condition that the working frequency is either high or low as compared with the frequency of gyromagnetic resonance. At low frequencies and high linear plasma density, the plasma waveguide is effectively excited by the coaxial line. In the vicinity of the plasma frequency the waveguide is weakly connected with the line, and, therefore, a fragment of such a waveguide, limited on both sides by the coaxial cable, can serve as a cavity resonator. [Translation of abstract] [DW]

SUB CODE: 20, 09/

Card 2/2

ACC NR: AT7004046 SOURCE CODE: UR/3137/66/000/255/0001/0013

AUTHOR: Kurilko, V. I.

ORG: none

TITLE: Stability of a modulated beam in an iris-loaded waveguide

SOURCE: AN UkrSSR. Fiziko-tekhnicheskiy institut. Doklady, no. 255/T-041, 1966. Ustoychivost' modulirovannogo puchka v volnovode nagruzhennom diskami, 1-13

TOPIC TAGS: waveguide propagation, beam waveguide, wavegide iris, beam modulation

ABSTRACT: In view of the fact that earlier investigations of the stability of a beam in an accelerating waveguide wre made under the assumption that the waveguide is unbounded and under other simplifying assumptions, the author determines the growth increments of the instability of an accelerated modulated beam moving in an iris-loaded waveguide, without imposing any limitations on the length of each section, on the current, and on the ratio of the resonant to modulation frequencies. A relation is established between the growth increment and the detuning, and it is shown that when the detuning is large the modulation does not affect the growth increment. When the modulation is small, its presence leads to a decrease in the growth increment compared with the unmodulated beam (for the same value of the current), but only under certain conditions. Estimates are also presented for the threshold current and for the Q of each waveguide section. The main conclusions of the analysis are that the presence of modulation in the beam leads to an increase in the threshold current only

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ACC NR: AT7004846

if the detuning is very small. At a given current, the depth of modulation (the phase dimension of the plasma) does not influence the growth increment of the instability. If the waveguide is not matched at the frequency of the defocusing isolation, the instability is absolute, and the field increases exponentially with time at any point of the section. A decrease in the Q of the system leads to an increase of threshold current. It is therefore not advantageous to use superconducting sections, at least at the beginning of the accelerating system, where the energy is small. An explanation is offered for the decrease in the threshold current with increasing number of sections. The author thanks I. A. Grishayev, A. I. Zykov, V. A. Vishnyakov, and G. D. Kramskiy for reporting their experimental data, and Ya. B. Faynberg for suggesting the topic and a discussion of the results. Orig. art. has: 21 formulas.

SUB CODE: 09/ 20/ SUBM DATE: 00/ ORIG REF: 010/ OTH REF: 008



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KURILLO, A. S. PROF.

Bridges, Concrete

Use of "Isteh" in building reinforced concrete bridges. Nauk. zap. LPI, No. 1, 1947.

Monthly List of Russian Accessions, Library of Congress, December 1952. Unclassified.

KARANTONIS, F.E.; KURILLOV, F.N.; MUKHOMEDIYAROV, F.B.

Fishes of the middle Lena. Trudy Inst.biol.IAk.Fil.AN SSSR no.2: 3-144 '56. (MIRA 9:12)
(LENA RIVER--FISHES)

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