EWT(l)/EPF(n)-2/EWG(m)/EPA(w)-2 P9-6/Pe-4/Pab-10/P1-4 IJP(c)
AP5009756 UR/0000/64/004/000/0083/0084 WW/AT/GS

AUTHOR: Kontorovich, V. M., Kutik, I. N.

The problem of wave transformations at plasma boundaries within magnetic

Soveshchaniye po teoreticheskoy i prikladnoy magnitnoy gidrodinamike. 3d,

soveshchaniya, v. 4. Riga, Izd-vo AN Latvsk, [illegible]

plasma boundary effect, plasma wave transformation, magnetohydrodynamic wave

ABSTRACT: G. B. Field was the first to study the transformations of longitudinal plasma waves on the sharp plasma-vacuum boundary in the hydrodynamic approximation (Astr. J., 1956, 124, 555). The plasma was within a perpendicular magnetic field and was bounded by a wall. Consequently, in addition to the continuity of the tangential components of the electric and magnetic fields, one had to demand the discontinuity of the normal electric field component. A. H. Kritz and D. Mintzer (Phys. Rev., 1960, 117, 2, 382) dropped the "hard vacuum" requirement and discussed, for the case of no magnetic field, the wave transformation at the boundary between two

Card 1/2

KONTOROVICH, V. M.

USSR/Chemistry - Physical chemistry

Card 1/1 Pub. 147 - 10/27

Authors : Palatnik, L. S., and Kontorovich, V. M.

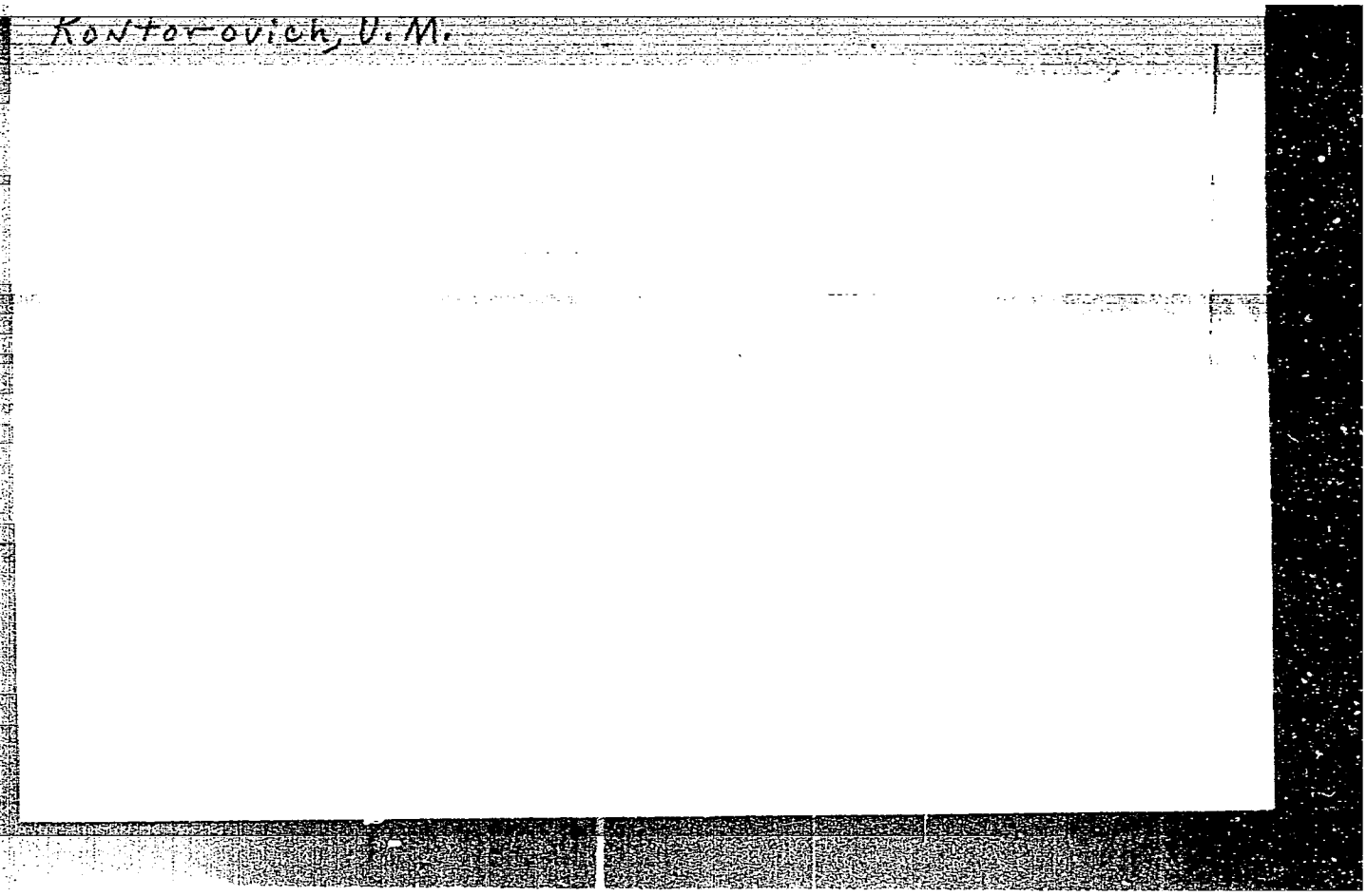
Title : Analytical investigation of multi-component heterogeneous systems by the method of generalized law "of center of gravity".

Periodical : Zhur. fiz. khim. 28/9, 1599-1614, Sep 1954

Abstract : The development of an analytical, generalized center-of-gravity method for the study of multi-component heterogeneous systems, is announced. This method was found to be mathematically quite simple and its application to concrete systems consists in actual calculation of the determinants. The advantages of such analytical methods over geometrical methods are listed. Mass ratios for phases forming during crystallization processes of any given variance are presented. The various possible ways of the invariant process in relation the component concentration in the basic solution, were discussed. Four USSR references (1937-1954).

Institution : The A. M. Gorkiy State University and the V. I. Lenin Polytechnicum, Kharkov

Submitted : December 21, 1953



KONTOROVICH, V.M.

Category : USSR/Atomic and Molecular Phyiscs - Low-temperature Physics D-5

Abs Jour : Ref Zhur - Fizika, No 2, 1957 No 3518

Author : Kontorovich, V.M.
Inst : Physicotechnical Institute, Academy of Scineces Ukrainian SSR
Title : Effect of Rate of Flow of a Film of He II on its Thickness.

Orig Pub : Zh. eksperim. i teor. fiziki, 1956, 30, No 4, 805

Abstract : Taking into account the dependence, known from Landau's theory, of the thermodynamic potential μ of He II on the relative velocity of the components, the author writes down and integrates the equation of motion of the superfluid component in a film next to the wall (the notmal component is at reat). An expression is obtained for the dependence of the film thickness δ on the speed Q of liquid flow over the film. It turns out that $\delta(Q) = \delta(0)(1-q)$, where $\delta(0) = (\beta/gz)^{1/3}$ is the thickness of the film at a height z at $Q = 0$ (according to Frenkel; β takes into account the Van-der-Waals interaction with the wall), and $q = (Q^2/\beta)\cdot(\rho_s/6\rho)\delta(0)$. An estimate yields $q \sim 10^{-1} - 10^{-2}$.

Card : 1/1

AUTHOR ITSKEVICH, E.S., KONTOROVICH, V.M. PA - 2085
TITLE Heat Capacity of Laminar Structures at Low Temperatures (K teorii teploemkosti sloistykh struktur pri nizkikh temperaturakh).
PERIODICAL Zhurnal Eksperimental'noi i Teoret. Fiziki, 1957, Vol 32, Nr 1, pp 175-177 (U.S.S.R.)
Received 5/1957 Reviewed 4/1957

ABSTRACT Heat capacities of laminar and chain-like structures are not subjected to the DEBYE-theorem $C \sim (T/\Theta)^3$ in the case of low temperatures. According to I.M.LIFSHITS the deviation from the T^3-rule is in connection with the special role of bending waves in such structures. The anomalous form of the dispersion law concerning bending waves leads to an anomalous temperature dependence of the energy of crystals. In the case of temperatures, at which interaction between the layers cannot be neglected, the following precise formula is obtained $(1/A)d/ds(Cs^2) = s^3 d^3/ds^3 \ln\Gamma(s) - s(s+1) - 1/6$. Thus it is easily possible to tabulate heat capacity of laminar crystals in the range of lowest temperatures ($T \ll \eta\Theta, \zeta\Theta$) as a function of temperature. A comparison with the experiment is possible, although elastic constants for laminar lattices in the temperature range investigated are not known. In the case of $s \to 0$ it actually holds that $s^2C/A \to 0{,}0914$ (range of quadratic temperature dependence of heat capacity) and in the case of $s \to \infty$ ($T \to 0$) it holds that $s^3C/A \to 1/30$ (range of cubic dependence). By determining the necessary combinations of the constants from the boundary value theorems, it is possible to plot the whole curve. Hitherto the necessary experimental data have been lacking. The new data

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SUBMITTED 18. 10. 1956
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Card 2/2

KONTOROVICH, V. M.

AUTHOR: Kontorovich, V. M. 56-4-46/54

TITLE: On the Use of Two Auxiliary Fields for Obtaining States Capable of Emission in a Quantum Mechanical Amplifier or Generator (O primenenii dvukh vspomogatel'nykh poley dlya polucheniya emissionnykh sostoyaniy v kvantomekhanicheskikh usilitelyakh i generatorakh). (Letter to the editor)

PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol. 33, Nr 4, pp. 1064-1065 (USSR)

ABSTRACT: In order that a particle system possesses a negative absorption, it is necessary that an excess number of particles (active "molecules") is produced on the topmost energy level (m) of the given transition (m → q) . It is shown that "active molecules" can be obtained by the method of "impulse inversion" with the use of two auxiliary fields, in which connection the frequency of the auxiliary fields is somewhat smaller then the frequency of the working transition. It has to be pointed out, however, that a special level scheme has to be required, in which case the transitions between the levels are permitted and that at least the frequency of one of the auxiliary fields is twice

CARD 1/2

KONTOROVICH, V.M.

56-6-16/47

AUTHORS: Kontorovich, V. M. , Prokhorov, A. M.

TITLE: On the Nonlinear Effects of the Interaction of the Resonance Fields in a Molecular Generator and Amplifier (O nelineynykh effektakh vzaimodeystviya rezonansnykh poley v molekulyarnom generatore i usilitele)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1957, Vol. 33, Nr 6 (12), pp. 1428 - 1430 (USSR)

ABSTRACT: On the basis of the analysis of the polarizability of a quantum-like system (which is at the same time in 2 resonance fields) the position of the possible frequencies of production and amplification is investigated by the present paper by taking account of saturation with respect to an auxiliary field. May this quantum system be assumed to have a non-equidistant discrete spectrum. The frequencies ω_1 and ω_2 are near the frequencies ω_{mn} and ω_{mq} of the transitions between any 2 levels of the system, if one of these 2 resonance levels is common to both fields. Just these levels are here described as resonance levels. At first an expression for the Fourier components of the average dipole moment in the here investigated case of a gas is given. For the molecules of this gas

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frequency is nonlinear ...

Card 2/3 generator will depend on the frequency and also on the amplitude

AUTHOR: Kontorovich, V.M. 56-6-40/47

TITLE: On the Problem of the Stability of Shock Waves (K voprosu ob ustoychivosti udarnykh voln)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1957, Vol. 33, Nr 6(12), pp. 1525-1526 (USSR)

ABSTRACT: The stability of normal explosions in any medium with respect to wave-like disturbances of the discontinuity surface was investigated by D'yakov [Ref. 1] . He ascertained domains with absolute instability when the disturbances caused by discontinuity increase with time, and a domain of stability in which these disturbances are damped. Finally, he found a peculiar domain with "spontaneous sound radiation by the point discontinuity", in which the disturbances have the shape of undamped propagated waves. This last domain was, however, according to the author's opinion, not fully determined. The author here writes down the conditions for spontaneous radiation. In addition to a domain already mentioned by D'yakov there is a further domain, in which the radiated waves move in the same direction as the shock wave, and gradually lag behind it. The entire domain of radiation is fully determined by an inequation given here. It is of interest to note that

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AUTHOR: Kontorovich, V.M. 56-6-41/47

TITLE: Reflection and Refraction of Sound by a Shock Wave (Otrazheniye i prelomleniye zvuka udarnoy volnoy)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1957, Vol. 33, Nr 6, pp. 1527-1528 (USSR)

ABSTRACT: The reflection- and refraction coefficients mentioned in ref. 3 are probably wrong, because the disturbance of the surface of the shock wave has not been taken into account.
For the vortex- and sound disturbances the equations with boundary conditions are set up and the respective solutions are given. The author proceeded from the notion that the shock wave moves in a relatively thin medium with supersonic-, and in a relatively highly compressed medium with subsonic velocity. If, therefore, another sound wave impinges upon the explosion surface coming from the compressed medium, reflected sound waves are formed and vortex disturbances are caused. If the sound wave impinges upon the shock wave from the side of the rarefied medium, no reflected wave but a vortex wave is formed. There are 1 figure and 5 references, 3 of which are Slavic.

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KONTOROVICH, V. M.

AUTHOR: Kontorovich, V. M. 56-1-26/56

TITLE: The Stability of Shock Waves in Relativistic Hydrodynamics. (Ustoychivost' udarnykh voln v relyativistskoy gidrodinamike)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol. 34, Nr 1, pp. 186-194 (USSR)

ABSTRACT: The present paper investigates the stability of the shock waves in any medium which can be described by the relativistic equations of an ideal liquid, with reference to small disturbances of the surface of discontinuity. The conception of the ideal liquid can be used in two limiting cases of relativistic hydrodynamics: at sufficiently low temperatures and in the ultrarelativistic limiting case of superhigh temperatures. In the first-mentioned limiting case, here designated as relativistic, a continuity equation applies in zeroth approximation (with regard to the ratio of the number of pairs to the number of particles. In the ultrarelativistic limiting case the chemical potential μ is in the zeroth approximation (with regard to the ratio of the number of true particles to the number of

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pairs) equal to zero. In both limiting cases the entropy is conserved. The motion of the shock wave in the medium toward which it runs must be supersonic-like and in the medium left behind by the shock wave - subsonic-like. Therefore the disturbance of the surface of discontinuity only manifests itself on the flow behind the abutting end. The following sections of this paper treat the variation of the equations of motion, the boundary conditions in the point of sudden irregularity, the derivation of the characteristic equation, the characteristic equation and its interpretation and the spontaneous emission of sound throught the point of sudden irregularity. The ultra-relativistic shock waves have no domain with absolute instability. Furthermore no spontaneous emission of sound exists in the ultrarelativistic case and under certain conditions the shock waves are absolutely stable. There are 6 references, 5 of which are Slavic.

ASSOCIATION: Institute for Radiophysics and Electronics AN Ukrainian SSR (Institut radiofiziki i elektroniki Akademii nauk Ukrainskoy SSR)

SOV/56-34-3-54/55

AUTHOR: Kontorovich, V. M.

TITLE: The Interaction of Fields in Overkhauzer-Effect (Vzaimodeystviye poley pri effekte Overkhauzera)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol. 34, Nr 3, pp. 779 - 781 (USSR)

ABSTRACT: The present work shows within the scope of the relaxation theory developed by Bloch (Reference 1) that the relaxation--transitions can substantially change the character of saturation in the simultaneous action of 2 intense resonance fields on a system with discrete spectrum. In a change of the degree of occupation of the resonance levels in consequence of a saturation by the field, the degree of occupation changes with all levels which are correlated with the resonance levels by means of relaxation transitions (generalized Overkhauzer-effect). The author investigates here the interaction of two fields with the frequencies ω_1 and ω_2, $|\omega_{pq} - \omega_1| \lesssim \Gamma$, $|\omega_{mn} - \omega_2| \lesssim \Gamma$, which have no com-

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The Interaction of Fields in Overkhauzer-Effect

mon resonance level. The author starts from the addition $\hat{D}(t)$ to the density matrix $\hat{\rho}^0$ (which defines the resonance part of the mean dipole-moment $\vec{d}(t) = Sp(\hat{d}\,\hat{D}(t))$ corresponding to the equilibrium. The relaxation is described by a certain linear transformation $\Gamma(\hat{D})$. Their coefficients have the importance of inverse relaxation times for various transitions and it is sufficient to consider their final coefficients as phenomenological parameters. A set-up for the solution is written down here. A term for the "form of the line" is equally written down. With $\hbar a/kT \ll 1$, the interaction narrows the lines widened by the saturation effect. The intensity of this effect is determined by the combination of the "crossed" relaxation times and does not additionally depend on the distances between the resonance levels. There are 4 references, 1 of which is Soviet.

ASSOCIATION: Institut radiofiziki i elektroniki Akademii nauk Ukrainskoy SSR (Institute for Radiophysics and Electronics AS Ukrainian SSR)

SUBMITTED: January 2, 1958

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10(4), 24(5) SOV/56-35-5-23/56

AUTHOR: Kontorovich, V. M.

TITLE: On the Interaction Between Small Perturbations and Discontinuities in Magnetohydrodynamics and the Stability of Shock Waves (O vzaimodeystvii malykh vozmushcheniy s razryvami v magnitnoy gidrodinamike i ob ustoychivosti udarnykh voln)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 5, pp 1216-1225 (USSR)

ABSTRACT: In the steady homogeneous flow of an infinitely conductive liquid in a magnetic field there exist various kinds of small perturbations with different dispersion laws: $\omega = \omega(\vec{k})$: magnetohydrodynamic-, magnetosonic-, and entropy waves. In the presence of discontinuities, these different kinds go over into one another, so that all are always present. The stability of shock waves and their splitting up has already been investigated by Akhiyezer, Lyubarskiy, and Polovin (Ref 1). Also in the present paper the stability of shock waves with respect to splitting-up and with respect to inclined incident perturbations is investigated. In this connection the fact is of considerable interest that within a certain angular range the projections of

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On the Interaction Between Small Perturbations and Discontinuities in Magnetohydrodynamics and the Stability of Shock Waves

phase- and group velocity on to the line which is vertical to the discontinuity have different signs, and for the purpose of a regular solution of the stability problem, it is necessary to proceed from a separation into incident and emitted waves, and not from phase- and group velocity. In ordinary hydrodynamics the interaction between sound and shock waves (for a perfect gas) was investigated by Blokhintsev, Burgers (Byurgers), and Brillouin (Brilluen) (Refs 2,3), as well as (for any nonviscous liquid) by Kontorovich (Ref 4). For the perturbations investigated by the present paper the following applies: a) Entropy waves: $\omega_o(\vec{k}) = 0$. b) Magnetohydrodynamic waves (or Al'fven-waves: $\omega_o(\vec{k}) = \pm \vec{k}\vec{u}$, $\vec{u} \equiv \vec{H}/\sqrt{4\pi\rho}$. c) Magnetosonic waves (adiabatic motion): $\omega_o^2(k) = \frac{k^2}{2}\left[s^2 + u^2 \pm \sqrt{(s^2+u^2)^2 - 4s^2u^2\cos^2\theta}\right]$ (s = sound velocity). A simple geometric method for the construction of waves diverging (reflected and refracted) from a discontinuity surface is developed. These waves are produced by the incidence of a plane monochromatic wave on a plane steady

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On the Interaction Between Small Perturbations and Discontinuities in Magnetohydrodynamics and the Stability of Shock Waves

discontinuity surface in a medium which can be described by the equations of magnetohydrodynamics. The paper is divided into the following chapters: 1) Introduction, 2) Small perturbations, 3) Boundary conditions for the discontinuity surface, 4) Refraction and deflection laws, 5) Inciding and emitted waves, 6) Stability of shock waves, 7) Mixed frequencies. A variation of the frequency as a result of interaction of small perturbations with shock waves is investigated. The author received this paper for correction on September 30, 1958, on which occasion he made a foot-note in connection with a paper by Syrovatskiy, which is intended to be published in the next copy of this periodical. The author thanks A. I. Akhiyezer, G. Ya. Lyubarskiy, and R. V. Polovin for letting him know the results they obtained with respect to stability already before publication of the papers, as well as for discussions. There are 4 figures and 13 references, 12 of which are Soviet.

ASSOCIATION: Institut radiofiziki i elektroniki Akademii nauk Ukrainskoy SSR (Institute for Radiophysics and Electronics of the Academy of

Card 3/4

Kontorovich, V. M.

Voprosy Magnitnoy Gidrodinamiki i Dinamiki Plazmy. Trudy Konferentsii Po Magnitnoy Gidrodinamike, Riga, 2-10 Iyulya 1953 g. (Problems of Magnetohydrodynamics and Plasma Dynamics. Works of the Conference On Magnetohydrodynamics, Riga, 2-10 July 1953), Riga, 1959, 339 pp

The majority of the texts of the 55 conference reports and discussions of reports are presented in the source in abridged form. Previously published reports are included there as brief abstracts only. The material published there for the first time (abridged and unabridged) are as follows:

"The Role of Magnetohydrodynamics and Plasma Dynamics in Certain Problems of Astrophysics," by D. A. Frank-Kamenetskiy, Moscow, pp 7-11

"Magnetohydrodynamics and the Study of Variations of Cosmic Rays," by L. I. Dorman, Moscow, pp 13-44

"Cosmic Ray Spectra and Their Role in Cosmic Gas Dynamics," by S. I. Syrovatskiy, Moscow, pp 45-48

"The Influence of a Magnetic Field on the Stability of Flow of a Conducting Fluid," by Ye. P. Velikhov, Moscow, pp 49-53

"Some Problems of the Motion of a Rarefied Plasma in a Magnetic Field," by Ya. P. Terletskiy, Moscow, pp 59-62

"On Nonlinear Steady-State Motions of a Rarefied Plasma in a Magnetic Field," by R. Z. Sagdeyev, Moscow, pp 63-65

"On One Criterion of Applicability of the Equations of Magnetohydrodynamics to a Plasma," by S. I. Braginskiy, Moscow, pp 67-71 (Discussion of the report by R. V. Polovin, Khar'kov, pp 71-72)

"On the Possibility of Accelerating Charged Particles by Means of Stock Waves in a Magnetized Plasma," by L. I. Dorman and G. I. Freydman, Moscow and Gor'kiy, pp 77-81

"On the Acceleration of Charged Particles During Powerful Impulse Discharges and During the Collision of Magnetized Clouds," by L. I. Dorman, Moscow, pp 83-88

"The Influence of a Longitudinal Magnetic Field on the Temperature of the Electrons in a Plasma," by M. V. Konyukov, Tula, pp 89-92

"Investigation of Certain Characteristics of a Plasma of Xenon and Argon Behind a Powerful Shock Wave," by S. R. Kholev, Moscow, pp 93-105

"Observation of Electrodynamic Contraction of an Arc With the Aid of an Electron-Optical Converter," by V. L. Granovskiy, K. P. Prsmina, V. I. Savoskin, and G. G. Timofeyeva, Moscow, pp 107-115

"On the Interaction of Weak Perturbations With Discontinuities and the Stability of Shock Waves in Magnetohydrodynamics," by V. M. Kontorovich, Khar'kov, pp 117-125

"On the Stability of Shock Waves in Magnetohydrodynamics," by S. I. Syrovatskiy, Moscow, pp 127-131

"On the Scattering of Hydromagnetic Waves on Turbulent Fluctuations," by A. G. Sitenko and Yu. A. Kirochkin, Khar'kov, pp 143-146

"On the Damping of Magnetohydrodynamic Waves in a Plasma," by R. Z. Sagdeyev, Moscow, pp 147-149

"Simple Waves in Magnetohydrodynamics," by A. I. Akhiyezer, G. Ya. Lyubarskiy, and R. V. Polovin, Khar'kov, pp 151-157

"Two-Dimensional Problems of Magnetohydrodynamics," by G. S. Golitsyn, Moscow, pp 161-165

"On Wave-Induced Flows in Magnetohydrodynamics," by A. I. Ivanovskiy, Moscow, pp 167-171

"Oscillations of an Infinite Gas Cylinder With Its Own Gravitation in a Magnetic Field," by I. M. Yavorskaya, Moscow, pp 175-183

"On Magnetic Boundary Layers and Electric Current Discharges in Moving Media," by V. N. Zhiguler, Moscow, pp 185-190

KONTOROVICH, V. M.: Master Phys-Math Sci (diss) -- "Some problems of the stability and interaction of perturbation with shock waves". Khar'kov, 1959. 9 pp (Min Higher Educ Ukr SSR, Khar'kov Order of Labor Red Banner State U im A. M. Gor'kiy), 150 copies (KL, No 9, 1959, 112)

24(1) SOV/46-5-3-7/32

AUTHOR: Kontorovich, V.M.

TITLE: Reflection and Refraction of Sound by Shock Waves (Otrazheniye i prelomleniye zvuka na udarnykh volnakh)

PERIODICAL: Akusticheskiy zhurnal, 1959, Vol 5, Nr 3, pp 314-323 (USSR)

ABSTRACT: The author discusses plane steady-state shock waves propagated in an infinite non-viscous liquid or gas and their interaction with a monochromatic acoustic wave or a similar small perturbation. It is assumed that the Rankine--Hugoniot conditions are satisfied at the surface of discontinuity. The acoustic reflection and transmission coefficients are found and the laws of reflection and refraction are given in a simple geometrical form. The author discusses also acoustic "location" of the discontimuity surfaces. The paper is entirely theoretical. It has already been published in abbreviated form (Ref 1). Acknowledgments are made to Ya.B. Zel'dovich and S.V. Iordanskiy for their advice. There are 5 figures and 12 references, 10 of which are Soviet, 1 English and 1 French.

Card 1/1

ASSOCIATION: Institut radiofiziki i elektroniki AN UkrSSR, Khar'kov (Radiophysics and Electronics Institute, Ac.Sc. USSR, Khar'kov)

SUBMITTED: December 17, 1957

85985

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E192/E382

9.2574

AUTHOR: Kontorovich, V.M.

TITLE: Theory of a Travelling-wave Maser

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1960, Vol. 3, No. 4, pp. 656 - 666

TEXT: The travelling-wave maser developed by de Grasse et al (Refs. 1, 2) seems to be the most promising device for a wideband amplification of signals with low noise levels. In this device, as in other three-level masers, a crystal with a paramagnetic impurity is situated inside a magnetic field H , which produces the Zeeman spectrum of the admixture (Ref. 3). This quantum system is placed simultaneously in two resonance fields: a strong "pumping" field having a frequency ω_1 (where $\omega_1 \approx \omega_{mq}$) and a weak field of the signal to be amplified which has a frequency ω (where $\omega \approx \omega_{mn}$). The indices m, n and q represent the quantum numbers of the resonance energy levels while ω_{mn} and ω_{mq} are the corresponding transition frequencies. The "pumping" field provides the negative attenuation necessary for the

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Theory of a Travelling-wave Maser

amplification at the frequency ω . It is assumed that the rules of exchange for the transition $m \leftrightarrows n$ correspond to the selection rules described by:

$$d^{+}_{nm} = d^{-}_{mn} = d^{y}_{mn} = d^{y}_{nm} = 0, \quad d^{+}_{mn} = (d^{-}_{nm})^{*} \neq 0 \qquad (1)$$

where $\hat{d}^{\pm} = \hat{d}^{z} \pm i\hat{d}^{x}$ is the magnetic-moment operator. Assuming that the magnetic field H is directed along the axis y , the magnetic moment at frequency ω can be written as:

$$\underline{M}(t) = \mathrm{Re}\left\{\underline{d}_{nm}(\underline{d}_{mn}H)\, Qe^{-i\omega t}\right\} \qquad (2)$$

where Q is a factor determining the form of a line; Q is independent of the amplitude $\underline{H}$ of the signal to be amplified. The tensor of the permeability is in the form of Eq. (4), where $i\alpha$ is defined by Eq. (5). The average

Theory of a Travelling-wave Maser

density of the magnetic losses over a period is given by Eqs. 6 or Eq. (7). The axial component of the magnetic field is given by Eq. (8). The amplification coefficient δ is defined by (Ref. 2):

$$\frac{\Sigma(L)}{\Sigma(0)} = e^{\delta}, \quad \delta = -\frac{\alpha'_{max}\,\omega L}{v_{rp}} F \qquad (9),$$

where $\Sigma(z)$ is the average energy flow through the transverse cross-section, v_{rp} is the group velocity of the wave, L is the length of the system and F is the filling factor. For a delay system with a surface wave, the amplification is given by:

$$\delta = -2\gamma'' L \qquad (11)$$

where γ'' is the imaginary part of the longitudinal-wave number. This can be expressed by:

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Theory of a Travelling-wave Maser

$$2\gamma'' = P/\Sigma \qquad (12)$$

where P is the average power loss per unit length. It is assumed that the delay system can be described by means of a reactive surface impedance. The phase velocity in the direction of propagation can therefore be expressed by Eq. (18), where Z is the surface impedance. It is shown that the energy flow can be expressed by Eq. (31), where A is the amplitude of the magnetic field and $k = \omega/c$; the average power-energy density per unit length in the system is expressed by Eq. (32). The average power loss per unit length is given by Eq. (33). It is therefore possible to write Eq. (12) as Eq. (34), which represents the amplification factor. This is plotted in Fig. 2 as a function of u_{Ω} . It is seen that the gain increases monotonically with the increase of the phase value for the case of the direct wave and it decreases for the reflected wave. The amplification bandwidth for this system

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Theory of a Travelling-wave Maser

can be determined by finding the roots of:

$$\delta(\nu) + \ln k = \delta(0) \qquad (45)$$

where $\nu = (\omega - \omega_{mn})/\Delta\omega$ and represents the frequency deviation from the resonant frequency. If the "pumping" field is tuned to the resonance and if the scattering properties of the delay system are neglected, $\delta(\nu)$ of Eq. (45) can be written as Eq. (48), where D is proportional to the difference of the effective populations of the levels m and n , while $u = |d_{mq} H_1 / \hbar \Delta\omega|$. The author thanks S.A. Peskovatskiy for useful advice.
There are 2 figures and 11 references: 7 English and 4 Soviet.

ASSOCIATION: Institut radiofiziki i elektroniki AN UkrSSR (Institute of Radiophysics and Electronics of the AS Ukrainian SSR)

SUBMITTED: February 18, 1960

Card 5/5

9,2674 (1055, 1163)

30759
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E192/E382

24.6200

AUTHORS: Grutsyuk, A.M., Kontorovich, V.M. and Chernyak, G.Ye.

TITLE: Theory of the quantum amplifier with a travelling surface wave

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, v. 4, no. 3, 1961, 484 - 495

TEXT: The paramagnetic resonance of the magnetically sorted ions situated in an external magnetic field and a strong internal crystal field takes place with an elliptical polarisation of the alternating magnetic field (Ref. 2 - Ye. Condon, G. Shortley- Theory of atomic spectra. IL, Moscow, 1949, p. 103; Ref. 3 - R. Karplus, J. Schwinger, Phys. Rev., 73, 1020, 1948; F. Bloch, Phys. Rev. 102, 104, 1956). The selection rules for the operator of the magnetic moment $\vec{d}$ can be always represented in the form:

$$d^{\eta}_{mn} = 0 , \qquad d^{\zeta}_{mn} = \frac{i}{a} d^{\xi}_{mn} \qquad (1) ,$$

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where ξ, η, ζ are real orthogonal axes which are suitably oriented with respect to the axes of the crystal and external magnetic field $\underline{H}_0$;

m and n are quantum numbers of the resonance energy levels of an ion (whose transition frequency is ω_{mn}), and

a is a real parameter.

The resonance portion of the mean magnetic moment induced by the alternating magnetic field $\underline{H}(t)$ is:

$$\underline{M}(t) = \mathrm{Re}\left\{\underline{d}_{nm}(\underline{d}_{mn}\underline{H}^{*})Qe^{-i\omega t}\right\} \qquad (2)$$

where $Q(\omega)$ is a factor determining the shape of the line. It is seen that the quantity $\underline{M}$ is determined by the projection of the vector $\underline{H}^{*}$ on the direction $\underline{d}_{mn}$. The field H^{*} is orthogonal to d_{mn} and determines two independent non-resonance

Card 2/ 2

Theory of the quantum amplifier ....

polarizations of the alternating magnetic field:

$$H_\eta = 0, \qquad H_\zeta = iaH_\zeta \tag{3}$$

$$H_\eta \neq 0, \qquad H_\zeta = H_\xi = 0 \tag{4}.$$

The average power absorbed in a unit volume is (Ref. 5 - L.D. Landau, Ye.M. Lifshits - Electrodynamics of Solid Media, GITTL, Moscow, 1957):

$$\bar{p} = \frac{i\omega}{16\pi}\left(\mu^*_{ik} - \mu_{ki}\right) H_i H_k^*$$

and since the permeability tensor is in the form:

Card 3/11/0

Theory of the quantum amplifier ....

$$\left\{\mu_{ik}\right\}=\begin{Vmatrix} 1+i\alpha a^2 & 0 & -\alpha a \\ 0 & 1 & 0 \\ \alpha a & 0 & 1+i\alpha \end{Vmatrix} \qquad (5)$$

where:

$$i\alpha = 4\pi^2 \left| d^{\zeta}_{mn} \right|^2 Q \qquad (6)$$

it follows that:

$$\bar{p} = \frac{\omega a'}{8\pi^2} \left| H_\zeta - iaH_\zeta \right|^2, \quad a' = \mathrm{Re}\, a \qquad (7)$$

The ratio $\bar{p}$ is a maximum when:

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$$H_\eta = 0, \qquad H_\zeta = iaH_\zeta \tag{8},$$

from which it is seen that the magnetic-field polarization is of the non-resonance type. In quantum amplifiers with a travelling wave (Ref. 8 - De Grasse, IRE, Wescon Conv. Record, August, 1958; Ref. 9 - De Grasse, Schulz-Du Bois, Scovill, BSTJ, 38, 305, 1959), amplification can be achieved by using delay systems producing group or phase velocity delays. The dependence of the amplifier on the phase velocity in the case of surface waves is investigated. In the symmetrical surface H-wave, propagating along the axis z, above a plane $x = 0$, it is assumed that the components E_y, H_x and H_z are finite and that $k_x = i\beta$, $k_y = 0$ and $k_z = \gamma$. The permeability of the system is $\mu = 1$ and its permittivity is ϵ. Consequently, the following expressions are true:

$$\gamma^2 - \beta^2 = k^2, \qquad k = \omega\sqrt{\epsilon}/c \tag{9}.$$

By introducing a normalized phase velocity $u = k/\gamma = v_\phi \sqrt{\varepsilon}/c$, β can be expressed by:

$$\beta = \frac{\sqrt{1 - u^2}}{|u|} k \ .$$

By considering the equation div $\underline{H} = 0$, it follows that:

$$H_x = igH_z$$

where:

$$g = \gamma/\beta = \operatorname{sgn} u / \sqrt{1 - u^2} \qquad (\operatorname{sgn} u = u/|u|) \qquad (10) \ .$$

The electric and magnetic fields are related by:

$$E_y = -Z(\omega)H_z \qquad (11) \ .$$

Card 6/11/0

where $Z(\omega)$ is the surface impedance of the directing plane, which is assumed to be purely reactive. The gain or amplification parameter of the system can be expressed by:

$$\gamma'' = \frac{\gamma}{u}\left[(a \operatorname{sgn} u + \sqrt{1 - u^2})^2 \cos^2\Theta + (a\sqrt{1 - u^2} + \operatorname{sgn} u)^2 \sin^2\Theta\right] \qquad (14)$$

where Θ is the angle between the axes ζ and x. The dependence of the gain γ'' on the phase-velocity for the direct and reflected waves for the case defined by:

$$\Theta_o = \pi/2, \quad g_o = a, \quad u_o = \sqrt{a^2 - 1}/a \qquad (16a)$$

is illustrated in Fig. 3. In the case of an isotropic surface impedance, when the longitudinal components of the travelling wave, expressed by:

Card 7/11/0

$$E_z = \sin(\delta y - \varphi) A e^{-\beta x + i(\gamma z - \omega t)} \qquad (19)$$

$$H_z = \sqrt{\varepsilon}\, B \cos(\delta y - \varphi) A e^{-\beta x + i(\gamma z - \omega t)}$$

where A and φ are arbitrary constants and the normalized quantities:

$$d = \delta/k, \quad b = \beta/k, \quad h = \gamma/k = 1/u$$

are related by:

$$h^2 - 1 = b^2 - d^2 \qquad (20),$$

the gain is expressed by:

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Theory of the quantum amplifier...

$$\gamma'' = \frac{\chi}{u}\left(1 - \frac{u^2}{1 + d^2u^2}\right) f(a, g, \Theta)$$

where:

$$g = (1 + d^2u^2)\left[1 + (d^2 - 1)u^2\right]^{-1/2} \operatorname{sgn} u \qquad (25)\ .$$

From this it is seen that the direct and reflected non-symmetrical waves are amplified in an identical manner. In the case of anisotropy surface impedance, where the boundary condition is expressed by:

$$E_y = -Z_2 H_z, \qquad E_z = Z_1 H_y \qquad (27)\ ,$$

the amplification can be expressed by:

Card 9/11 10

Theory of the quantum amplifier...

$$\gamma'' = \frac{\chi}{u}\,\frac{d^2}{1-d^2}\left\{\left[a\sqrt{1-(1-d^2)u^2}+\operatorname{sgn} u\right]^2\cos^2\Theta + \left[a\operatorname{sgn} u+\sqrt{1-(1-d^2)u^2}\right]^2\sin^2\Theta\right\} \qquad (36).$$

This is similar to Eq. (14).
There are 4 figures, 4 tables and 15 references: 6 Soviet-bloc and 9 non-Soviet-bloc. The four latest English-language references mentioned are: Ref. 1 - I.J. Rabi, N.F. Ramsey, J. Schwinger - Rev. Mod. Phys., 26, 167, 1954; Ref. 6 - N. Bloembergen - Phys. Rev., 104, 324, 1956; Ref. 8 - quoted in text, also Ref. 9.

ASSOCIATION: Institut radiofiziki elektroniki AN UkrSSR (Institute of Radiophysics and Electronics of the AS UkrSSR)

SUBMITTED: August 1, 1960

Card 10/11

28932
S/056/61/041/004/016/019
B111/B112

9.3700
24.1200 (1109, 1144, 1327)

AUTHORS: Kontorovich, V. M., Glutsyuk, A. M.

TITLE: Conversion of sound waves into electromagnetic waves at a conductor boundary in a magnetic field

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 41, no. 4, 1961, 1195 - 1204

TEXT: Converting sound waves into electromagnetic waves, and vice versa, is of interest for studying magnetoacoustic effects exhibited by metals, sea water, and plasma for a direct generation of ultrasonics or electromagnetic waves in a conductor. From the standpoint of magnetohydrodynamics, the authors consider a conducting fluid , bordering a nonconducting semispace (air), if the wavelength of the sound and of the electromagnetic waves is much longer than the free path. Normal skin effect is occurring. $\omega_u/\omega_s \ll 1$, where ω_u is the Alfvèn wave frequency and ω_s the frequency of the sound wave. Furthermore, it is assumed that $\sigma/\varepsilon \gg \omega \gg \omega_u$. The authors confine themselves to weak hydromagnetic

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Conversion of sound waves into ...

coupling at infinite conductivity. The conversion factors of sound waves and electromagnetic waves are computed. Neglecting viscosity and thermal conductivity, the authors start from the dispersion equations and study the relationship between amplitudes of Alfvèn waves, slow and fast modified sound waves. The boundary conditions for sound and electromagnetic waves are thoroughly discussed in a particular part of the paper. The depth of penetration of electromagnetic waves in air is equal to $\lambda_3/(2\pi \sin \varphi_3')$, where λ_3 is the wavelength of incident sound, φ_3' the angle of incidence $\gg \frac{s}{c}$, s the sound velocity. All quantities involved in the boundary conditions are expanded by the authors with respect to eigen waves, and a linear inhomogeneous equation in the amplitudes of emitted waves is obtained for the boundary condition. In the following, a few formulas are given for the conversion factors of electromagnetic waves into sound waves, and vice versa, in air and in a conducting medium. For the conversion factor of sound waves into electromagnetic waves

Card 2/5

Conversion of sound waves into ...

$$\frac{E_n}{\overline{p'}} = \frac{2B\,(\sin\varepsilon\sin\varphi_3 + \cos\varepsilon\cos\gamma\cos\varphi_3)\,(\sqrt{i/\Omega}\cos\varphi_2 - \cos\varphi_3)}{\rho_0 sc\,(1+i\Omega)\,(1-Z)\left(\sqrt{i/\Omega}\cos\varphi_2 - \frac{s}{c}\cos\varphi_{3n}\right)}, \quad (38)$$

$$\frac{H_n}{\overline{p'}} = \frac{2B\sin\gamma\cos\varepsilon\,(\cos\varphi_2 - \sqrt{i/\Omega}\cos\varphi_3)}{\rho_0 s^2\,(1+i\Omega)\,(1-Z)\,(\cos\varphi_2 - (c/s)\sqrt{i/\Omega}\cos\varphi_{3n})}; \quad (39)$$

and

$$\frac{E_n}{p_3'} = \frac{2B\,(\sin\varepsilon\sin\varphi_3' - \sqrt{i/\Omega}\cos\varepsilon\cos\gamma\cos\varphi_2)\cos\varphi_3'}{\rho_0 sc\,((s/c)\cos\varphi_{3n} - \sqrt{i/\Omega}\cos\varphi_2)\,(1+i\Omega)}, \quad (40)$$

$$\frac{H_n}{p_3'} = \frac{2B\sin\gamma\cos\varepsilon\cos\varphi_3'}{\rho_0 s^2\,(1+i\Omega)\,((c/s)\cos\varphi_{3n} - \sqrt{\Omega/i}\cos\varphi_2)}. \quad (41)$$

hold when the wave falls in from air or from a conducting medium, respectively; here, $\Omega = \omega/\omega_3$, φ_3, $\varphi_{3\Lambda}$, ε, γ are angles of incidence of the sound wave, of the electromagnetic waves, angle of inclination of the magnetic field, angle enclosed by the component of the wave vector parallel to the boundary and by the surface z = 0.

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Conversion of sound waves into ...

$Z = (\bar{\varepsilon}_0 \bar{s} / \varrho_0 s')(\cos\varphi_3 / \cos\bar{\varphi}_3)$. The conversion of electromagnetic waves into sound waves is of interest for the investigation of solids.

$$\frac{p_3}{H_n'} = \frac{B \sin\gamma \cos\varepsilon \cos\varphi_{3,n}'}{2\pi(1+i\Omega)(\cos\varphi_{3,n}' + (s/c)\sqrt{\Omega/i}\cos\varphi_a)}, \quad (44)$$

$$\frac{p_3}{E_n'} = \frac{B \cos\varphi_{3,n}' (\sin\varepsilon \sin\varphi_a + \cos\varepsilon \cos\gamma \cos\varphi_a)}{2\pi(1+i\Omega)(\cos\varphi_a + (s/c)\sqrt{\Omega/i}\cos\varphi_{3,n}')}. \quad (45)$$

4

hold for the conversion factor of electromagnetic waves into sound waves. An acoustic field in the modified electromagnetic waves has been disregarded. The authors thank S. Ya. Braud for posing the problem. There are 3 figures and 5 references: 3 Soviet and 2 non-Soviet. The two most recent references to English-language publications read as follows: R. Simon, Astrophys. J., 128, 392, 1958; W. E. Williams, Astrophys. J., 131, 438, 1960.

ASSOCIATION: Institut radiofiziki i elektroniki Akademii nauk Ukrainskoy SSR (Institute of Radiophysics and Electronics of the Academy of Sciences Ukrainskaya SSR)

28932
S/056/61/041/004/016/019
B111/B112

Conversion of sound waves into ...

SUBMITTED: April 25, 1961

Card 5/5

24,2110 (1160, 1164 ONLY)
3,6000

B104/B214

AUTHOR: Kontorovich, V. M.

TITLE: Magnetohydrodynamic effects in the ocean

PERIODICAL: Doklady Akademii nauk SSSR, v. 137, no. 3, 1961, 576-579

TEXT: The author considers the sea as an incompressible viscous liquid which is weakly conducting and fills the semispace $z > 0$. A constant and homogeneous effect of the wind is assumed and the Coriolis force is taken into account. The equations of magnetohydrodynamics are obtained in the form:

$$d^2w/dz^2 - (b^2 \mp i2a^2)w = 0; \quad (1)$$

$$\frac{d\mathfrak{B}}{dz} = -\frac{4\pi\sigma}{c^2} B_z w; \quad (2)$$

$$j = -i\frac{\sigma}{c} B_z w. \quad (3)$$

Here, $w = v_x + iv_y$; $\mathfrak{B} = B_x + iB_y$; $j = j_x + ij_y$; $a^2 = \Omega|\sin\varphi|/\nu$;

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$b^2 = B_z^2\sigma/\eta c^2$; $l = (a\sqrt{2})^{-1}$ is a characteristic vertical flow scale in the absence of a magnetic field; b^{-1} is a characteristic scale related to the effects of electrodynamic and viscous forces; $M = b(a\sqrt{2})^{-1} = B_z l\sqrt{\sigma/\eta c^2}$ is the Hartman number; Ω is the angular velocity of the Earth's rotation; φ is the geographical latitude; η is the dynamical turbulent viscosity; $\nu = \eta/\varrho$; the upper sign in (1) belongs to the northern and the lower to the southern hemisphere. As is seen from (1),(2) and (3), $d\mathfrak{H}$ and j are expressed by w and satisfy Eq. (1) which possesses under the boundary conditions $dw/dz|_{z=0} = iT/\eta$, $w|_{z=\infty} = 0$ (5) the solutions

$$w = iU\exp\{-\varepsilon' z \pm i(\alpha + \varepsilon'' z)\}, \tag{6}$$

где

$$U = T/\eta|\varepsilon|, \quad 2\alpha = \operatorname{arcctg} M^2, \tag{7}$$

$$\varepsilon' + i\varepsilon'' = |\varepsilon|e^{i\alpha} = \sqrt{b^2 + i2a^2}, \quad \varepsilon' > 0, \quad \varepsilon'' > 0.$$

Magnetohydrodynamic effects ...

At a place far away from the equator, $M \ll 1$ and the effect of the magnetic field on the velocity is negligibly small. Then (6) goes over into the solution

$$w = iU_0 \exp(-az \pm i(\pi/4 + az)), \quad U_0 = T/\eta a\sqrt{2}. \tag{8}$$ (8).

It is next shown that if a vertical component of the magnetic field exists at the equator, the velocity of the flow directed by the wind at the surface is equal to that in the depth of the sea. As is shown, the finite depth of the sea must be taken into account in the usual hydrodynamics. From the solutions (6) and (8) for w the author derives the solutions

$$\mathfrak{B} = \mathfrak{B}_\infty = iH \exp(-\varepsilon' z \pm i(2\alpha + \varepsilon'' z)), \quad H = \frac{4\pi\sigma}{c^2}\frac{TB_z}{\eta|\varepsilon|^2}, \tag{9}$$ (9)

and

$$\mathfrak{B} - \mathfrak{B}_\infty = iH_0 \exp(-az \pm i(\pi/2 + az)), \tag{10}$$ (10)

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Magnetohydrodynamic effects...

for the magnetic field by using (2). From these solutions it is seen that in the sea currents caused by the wind an additional horizontal magnetic field is produced. This magnetic field is directed at 90° to the right of the direction of the wind in the northern hemisphere and by the same amount to the left of the wind direction in the southern hemisphere. An expression for the current orthogonal to the velocity is obtained from Eq. (3) with the help of (8). This is:

$$j = J_0 \exp(-az \pm i(\pi/4 + az)), \quad J_0 = \sigma B_z U_0/c. \qquad (12) \quad (12).$$

For $U_o \sim 20$ cm/sec, $J_o \sim 10^{-8}$ a/cm^2. In the following the magnetohydrodynamic effects for low-frequency oscillations on a large scale are discussed. The author assumes $\sigma/\varepsilon \gg \omega \gg \omega_u = 4\pi\sigma u^2/c^2$ ($\sigma/\varepsilon \sim 10^8$ cps, and $\omega_u \sim 10^{-12}$ cps for the sea). Oscillations corresponding to the Alfvèn waves and slow sound waves are damped in the usual skin depth.

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The equation $k^2/\omega^2 = i4k\sigma/c^2\omega$ holds for the dispersion of these branches. For the dispersion of fast magnetoacoustic waves at $\sigma = \infty$ the following relation holds:

$$\frac{k^2}{\omega^2} = \frac{1}{s^2}\left(1 - \frac{u^2}{s^2}\frac{\sin^2\theta}{1 + i\omega/\omega_s}\right), \quad \omega_s = 4\pi\sigma\frac{s^2}{c^2}, \quad \cos\theta = \frac{(kB)}{kB}, \qquad (14) \quad (14).$$

Here, s is the velocity of sound in the sea; u the Alfvèn velocity ; $\vec{k}$ the wave vector; ω_s the frequency at which the wave length of the acoustic wave in the sea is equal to that of the electromagnetic wave. The most interesting is the region $\omega \sim \omega_s$, for the coupling of the field amplitudes in an infrasound wave the following relation is given:

$$H = \frac{B}{\rho s^2}\frac{\sin\theta\vec{\eta}}{1 + i\omega/\omega_s}p', \quad E = -\frac{B}{\rho sc}\frac{\sin\theta\vec{\zeta}}{1 + i\omega/\omega_s}p',$$

$$j = i\frac{\omega c}{Bs}\frac{u^2}{s^2}\frac{\sin\theta\vec{\zeta}}{1 + i\omega/\omega_s}p', \qquad (15)$$

Card 5/7 $v = (\vec{\varkappa}/\rho s)p', \quad \vec{\eta}\sin\theta = [[\vec{\varkappa}, h], \vec{\varkappa}], \quad \vec{\zeta}\sin\theta = [\vec{\varkappa}, h].$

This yields for the infrasound waves in a magnetic field on account of the conductivity the expression:

$$\operatorname{Im} k = \frac{\omega^2}{2s^2}\frac{u^2}{s^2}\frac{c^2}{4\pi\sigma}\frac{\sin^2\theta}{1+(\omega/\omega_s)^2}. \qquad (18)$$

Next, a peculiar effect is briefly described. When an infrasound wave is incident on the interface between water and air (from whatever direction), besides the reflected and refracted sound there are produced also damped electromagnetic waves in and above the water. All these waves are also produced on the incidence of electromagnetic waves. For certain angles of incidence which follow from Snellius' law, the waves formed on the sea are surface waves and are propagated along the surface with a velocity which is almost equal to the horizontal component of the velocity of sound. There are 6 references: 3 Soviet-bloc and 3 non-Soviet-bloc.

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Magnetohydrodynamic effects...

ASSOCIATION: Institut radiofiziki i elektroniki Akademii nauk USSR (Institute of Radiophysics and Electronics, Academy of Sciences UkrSSR)

PRESENTED: October 22, 1960, by I. V. Obreimov, Academician

SUBMITTED: October 21, 1960

Card 7/7

S/141/63/006/001/002/018
E192/E382

AUTHORS: Kontorovich, V.M. and Tishchenko, N.A.

TITLE: Conversion of acoustic and electromagnetic waves on the boundary of an elastic conductor in a magnetic field

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, v. 6, no. 1, 1963, 24 - 35

TEXT: The impact of an electromagnetic wave on the boundary of a conductor situated in a magnetic field excites electromagnetic as well as acoustic waves. The latter are due to the action of the Lorentz force acting from the external magnetic field on the current flowing in the conductor. In turn, the acoustic wave impinging on the boundary induces electromagnetic waves. A problem of this type was considered by the authors in an earlier paper (ZhETF, 41, 1195, 1961). Here, it is investigated for the case of an isotropic conducting elastic semispace. It is assumed that the skin layer and the length of the sound wave are much longer than the electron-free path so that the conversion of the acoustic and electromagnetic waves can be regarded as a special case of

Conversion of ....

reflection and refraction of magnetoelastic waves. The hydromagnetic coupling is weak, so that:

$$u^2/s_{tr}^2 \ll 1, \quad u^2 = B^2/4\pi\rho \qquad (1)$$

and the frequency range is restricted to:

$$\sigma/\varepsilon \gg \omega \sim \omega_s \gg \omega_u \qquad (2)$$

where σ is the conductivity, ε is the permittivity, s_{tr} and s are the velocities of the transverse and longitudinal sound waves, respectively, $\underline{B}$ is the external magnetic field, u is the Alfven velocity, $\omega_s = 2\pi\sigma s^2/c^2$, which is the frequency at which the length of the longitudinal acoustic wave $\lambda\rho = 2\pi s/\omega$ is equal to the length of the electromagnetic wave in the material, $\lambda_{EM} = 2\pi c/\sqrt{4\pi\sigma\omega}$, and $\omega_u = 4\pi\sigma u^2/c^2$. Under these conditions there exist five types of wave in the conductor: two modified electromagnetic waves - the so-called Alfven wave and a slow magnetic-acoustic wave - and three modified acoustic waves (one

ACCESSION NR: AP4017034 S/0141/63/006/006/1129/1139

AUTHORS: Kontorovich, V. M.; Kutik, I. N.

TITLE: Mutual conversion of waves on a plasma boundary in a magnetic field

SOURCE: IVUZ. Radiofizika, v. 6, no. 6, 1963, 1129-1139

TOPIC TAGS: plasma, electromagnetic waves in plasma, plasma wave impedance, plasma wave impedance matching, plasma wave conversion, mutual plasma wave conversion, plasma boundary wave conversion, plasma wave resonance

ABSTRACT: The mutual conversion of longitudinal and transverse waves on an abrupt plasma boundary is considered in a weak magnetic field which is arbitrarily oriented relative to the boundary. The purpose of the research is to ascertain whether a narrow and sharp resonance, corresponding to matching of the wave impedances, is observed in this case in analogy with the mutual conversion of electromagnetic and sound waves (B. M. Kontorovich and A. M. Glutsyuk, ZhETF v. 41, 1195, 1961). A characteristic maximum of the angular

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ACCESSION NR: AP4017034

dependences of the conversion coefficient is found to exist and the frequency dependences of its position, height, and width are investigated, particularly in the resonance region. It is shown that in vacuum without a magnetic field all the conversion coefficients vanish, but the turning on of even a weak field makes wave conversion possible because of the appearance of transverse field components in the plasma wave. The authors are grateful to V. M. Yakovenko for useful discussions." Orig. art. has: 2 figures and 27 formulas.

ASSOCIATION: Institut radiofiziki i elektroniki AN UkrSSR (Institute of Radiophysics and Electronics, AN UkrSSR)

SUBMITTED: 18Dec62 DATE ACQ: 18Mar64 ENCL: 00

SUB CODE: PH NO REF SOV: 009 OTHER: 002

Card 2/2

KONTOROVICH, V.M.

Elasticity theory equations, and the dispersion of sound in metals. Zhur. eksp. i teor. fiz. 45 no.5:1638-1653 N '63.
(MIRA 17:1)

1. Institut radiofiziki i elektroniki AN UkrSSR.

ACCESSION NR: AP4024480 S/0141/64/007/001/0181/0182

AUTHORS: Kontorovich, V. M.; Chernyak, G. Ye.

TITLE: Line strength of magnetic-dipole transition in the hyperfine structure of the atom

SOURCE: IVUZ. Radiofizika, v. 7, no. 1, 1964, 181-182

TOPIC TAGS: atomic spectrum, hyperfine structure, magnetic dipole transition, line strength, hydrogen, deuterium, nitrogen 14, spontaneous transition, interstellar medium, radioastronomy, nitrogen concentration, interstellar nitrogen concentration

ABSTRACT: After pointing out that the line strength given by I. S. Shklovskiy (Kosmicheskoye radioizlucheniye, GITTL, M., 1956, Ch. 4) leads in the case of nitrogen to appreciable disparity with the correct results, the authors recalculate the line strength for hydrogen, deuterium, and N^{14}. The lines in question describe spontaneous

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ACCESSION NR: AP4024480

transitions between components of the hyperfine structure of atoms in the interstellar media, and are of importance to radio astronomy. The calculations show that the accumulation time for the nitrogen line is about one order of magnitude larger than indicated by Shklovskiy. However, should the real nitrogen concentration be larger than presently assumed, the results might change. "The authors are grateful to S. Ya. Braude and I. S. Shklovskiy for useful discussions." Orig. art. has: 3 formulas and 1 table.

ASSOCIATION: Institut radiofiziki i elektroniki AN UkrSSR (Institute of Radiophysics and Electronics, AN UkrSSR)

SUBMITTED: 22Apr63 DATE ACQ: 15Apr64 ENCL: 01

SUB CODE: PH, AS NR REF SOV: 002 OTHER: 005

Card 2/3

ACCESSION NR: AP4024480

ENCLOSURE: 01

1	2	3	4	5
Элемент	Переходы $F \to F-1$	Длина волны λ	Сила линии по формуле (3)	Сила линии по [?]
Водород	$1 \to 0$	21 см	3	3
Дейтерий	$3/2 \to 1/2$	91,6 см	5,3	6
Азот N^{14}	$5/2 \to 3/2$	11,47 м	14,4	60
	$3/2 \to 1/2$	19,14 м	13,3	30

Line strengths for hydrogen, deuterium, and N^{14} as obtained in this work and as given elsewhere

1 - Element, 2 - Transitions, 3 - Wavelength, 4 - by formula (3), 5 - by ref. [3], 4-5 - Line strength, 6 - Hydrogen, 7 - Deuterium 8 - Nitrogen

Card 3/3

L 22178-65 EWT(1) AEDC(a)/AFWL/ASDA-5/SSD/AFMDT/AFETR/ESDC/ESDG(s)/ESDT JW

ACCESSION NR: AP5001837 S/0056/64/047/006/2134/2149

AUTHOR: Giterman, M. Sh.; Kontorovich, V. M. B

TITLE: Effect of spatial dispersion on the propagation and scattering of waves near the critical point

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, no. 6, 1964, 2134-2149

TOPIC TAGS: wave propagation, wave scattering, sound propagation, second order phase transition, thermodynamic critical point, thermodynamic function

ABSTRACT: The general theory of fluctuation of hydrodynamic quantities is extended to include the case of media with spatial dispersion and is used to determine the characteristics of the mean and scattered fields (dispersion and absorption of waves, extinction coefficient of light, intensity of the Mandelstam-Brillouin, and others). These characteristics can be used in connection with experimental studies of the critical transition in media, and their knowledge has become important in view of possible logarithmic singularities of the specific heat, which can exist near the critical point. The connection between the density

Card 1/2

SUB CODE: ME, TD NR REF SOV: 016 OTHER: 004

Card 2/2

L 61502-65 EWT(1) Pg-4/Pi-4/Pl-4 LHB/GG
ACCESSION NR: AP5013897 UR/0056/65/048/005/1386/1392

AUTHORS: Kontorovich, V. M.; Tsukernik, V. M. 43 41 B

TITLE: State of an electromagnetic field with a definite field strength 21

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 5, 1965, 1386-1392

TOPIC TAGS: electromagnetic field, field state, field intensity value, wave function, occupation number, quantum electrodynamics

ABSTRACT: Since a free electromagnetic field can be described in quantum theory either by giving the photon occupation numbers or by giving the field strength, the authors consider the problem of finding states of the electromagnetic field in which the electrical or the magnetic field strength has a well defined value. The states of interest are those in which the field strength is given in all of space at one particular time, so that a complete set of the values of the electrical (or magnetic) field strength can be chosen in all

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L 61502-65
ACCESSION NR: AP5013897

2

points of space. The probability distribution is obtained for the different photon occupation numbers in states with well defined electric field strengths. It is noted that when the emission processes that create the field are statistically independent, the photons can also have a Poisson distribution, but in the present case the Poisson distribution occurs only for a particular combination of occupation numbers. The probability distribution for states with defined magnetic field strengths are obtained by analogy. The solutions obtained can be applied to any real Bose field, for example phoons or spin waves. Original article has: 22 formulas

ASSOCIATION: Institut radiofiziki i elektroniki Akademii nauk Ukrainskoy SSR (Institute of Radiophysics and Electronics, Academy of Sciences, UkrSSR); Fiziko-tekhnicheskiy institut Akademii nauk Ukrain- (Physicotechnical Institute, Academy of Sciences, UkrSSR)

Nov64 ENCL: SUB CODE: EM
OTHER:

Card 2/2

L 29205-66 JXT(CZ)
ACC NR: AP6007639 SOURCE CODE: UR/0141/66/009/001/0155/0166

AUTHOR: Vigdorchik, V. I.; Kontorovich, V. M. 35 B

ORG: Institute of Radiophysics and Electronics, AN UkrSSR (Institut radiofiziki i elektroniki AN UkrSSR)

TITLE: Stationary oscillations of the electron cloud in a cylindrical magnetron. Part 1 — Mechanism of stabilization

SOURCE: IVUZ. Radiofizika, v. 9, no. 1, 1966, 155-166

TOPIC TAGS: magnetron, electron cloud

ABSTRACT: A nonlinear mechanism of compression of the electron cloud by the r-f field, in a surface-wave magnetron, is theoretically analyzed. Only the "amplitude" nonlinear mechanism that limits the oscillations is taken into account; the "phase" nonlinear effects connected with the electron velocity modulation and responsible for the transfer of energy from the electrons to the alternating field is

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SUB CODE: UDC: 621.385.64

Card 2/2 ce

L 44727-66 EWT(1) IJP(c)

ACC NR: AP6031990 SOURCE CODE: UR/0386/66/004/005/0189/0192

AUTHOR: Kontorovich V. M.

ORG: Institute of Radiophysics and Electronics, Academy of Sciences, Ukrainian SSR (Institut radiofiziki i elektroniki Akademii nauk Ukrainskoy SSR)

TITLE: Influence of thermal expansion on the singularities of the kinetic coefficients at the Curie point

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 4, no. 5, 1966, 189-192

TOPIC TAGS: thermal expansion, Curie point, second order phase transition, ferromagnetism, carrier scattering

ABSTRACT: The author points out first that besides singularities of the kinetic coefficients near the second-order phase transition points and critical points, due to scattering of the carriers and connected with the mechanism of the phase transition and with the spectral structure responsible for the transition, there should also exist singularities that do not depend on the details of the scattering process and which are the consequence singularities of the thermodynamic mean values. He then considers a singularity resulting from the dependence of the carrier dispersion law on the lattice constant, and through it - owing to the thermal expansion of the crystal - on the temperature. Solution of the kinetic equation for the electron distribution function yields an expression for the conductivity change connected with the

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ACCESSION NR: AR4014943 S/0271/63/000/012/A047/A047

SOURCE: RZh. Avt., tel. i vy*chisl. tekhnika, Abs. 12A298

AUTHOR: Kontorovich, V. P.

TITLE: Use of a transformer as a linear mixer

CITED SOURCE: Sb. nauchno-tekhn. inform. Azerb. in-t nauchno-tekhn. inform. Ser. Avtomatika i telemekhan., vy*p. 1, 1963, 6-14

TOPIC TAGS: mixer, linear mixer, transformer application

TRANSLATION: The author considers the possibility of using a transformer with several primaries and a common secondary winding as a linear mixer connected at the output of the transformer of a multichannel telemetering system with frequency signal separation. To exclude saturation, the primaries are connected oppositely in paris with respect to the plate current. To reduce the parasitic plate modulation arising because of the contact between the windings, the channel input tubes are pentodes operating only on the sloping portion of the plate characteristic. Experiments were carried out on the mutual effects of the channels and the parasitic modulation factor computed. The transformer was loaded across an equivalent

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ACCESSION NR: AR4014943

impedance corresponding to an unwound KOBD-4 cable 3000 meters in length. The interaction of three channels was studied, and the average noise signal ratio turned out to be 0.4%. F.B.

DATE ACQ: 09Jan64 SUB CODE: GE ENCL: 00

Card 2/2

ALIZADE, G.A.; KONTOROVICH, V.P.

Reliability of measurement apparatus for field geophysical work. Izv.vys.ucheb.zav.; neft' i gaz 6 no.9:87-91 '63. (MIRA 17:2)

1. Azerbaydzhanskiy institut nefti i khimii im. M.Azizbekova.

KONTOROVICH, V.P.

Evaluating the reliability of a measurement. Izv.vys.ucheb.zav.; prib. 8 no.1:43-46 '65. (MIRA 18:3)

1. Azerbaydzahsnkiy institut nefti i khimii imeni Azizbekova. Rekomendovana kafedroy elektroniki, avtomatiki i telemekhaniki.

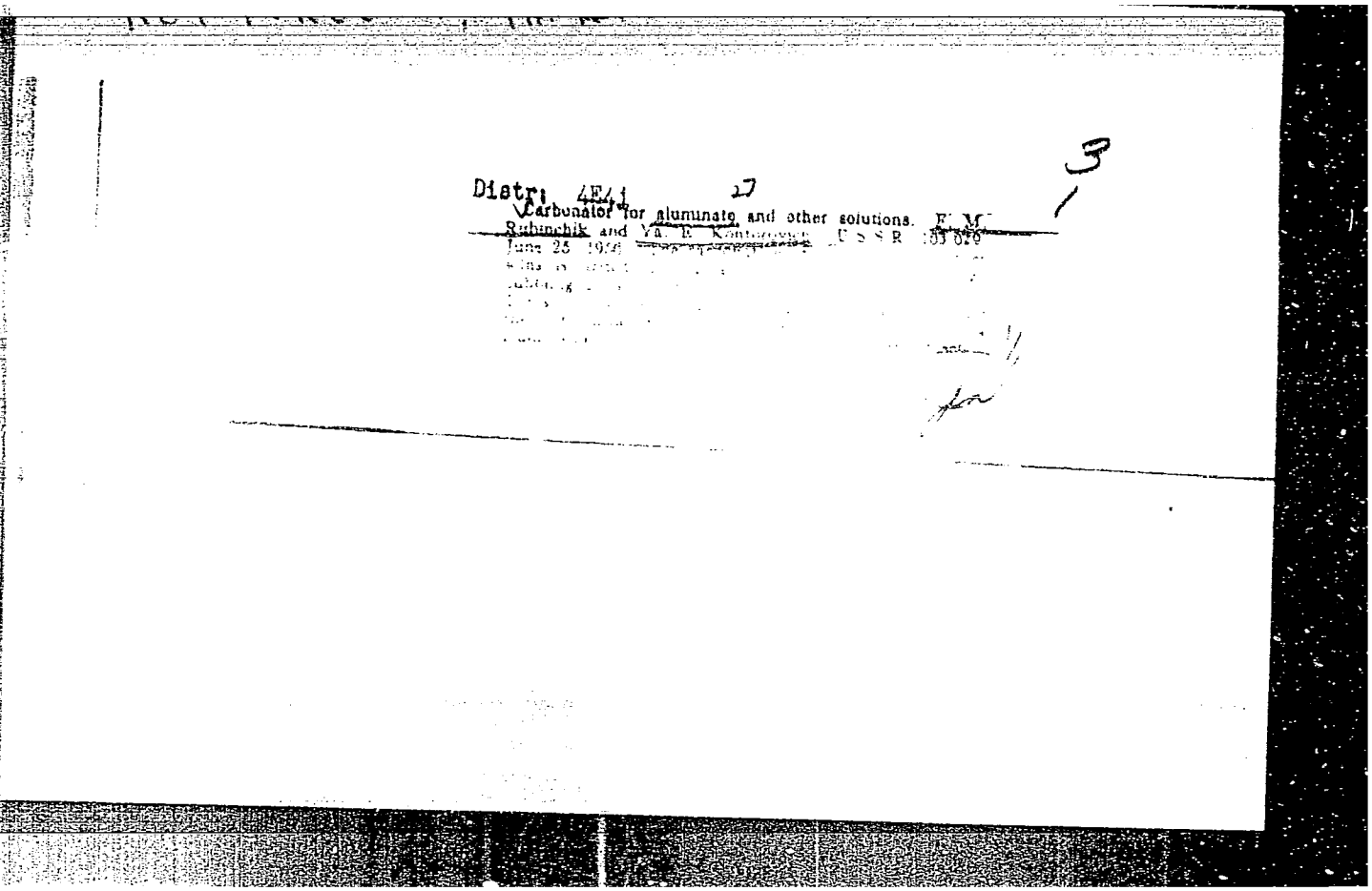
KONTOROVICH, Ya., kandidat tekhnicheskikh nauk; MIROSHNICHENKO, I.

A low-tonnage vessel for the local transport of large cargoes of food and industrial merchandise. Mor.flot 16 no.5:19-22 My '56. (MLRA 9:8)

1. TSentral'nyy nauchno-issledovatel'skiy institut ekonomiki i ekspluatatsii vodnogo transporta (for Kantorovich); 2. TSentral'nyy nauchno-issledovatel'skiy institut morskogo flota.
(Freighters)

KONTOROVICH, Y. E.; SOVALOVA, A. A.

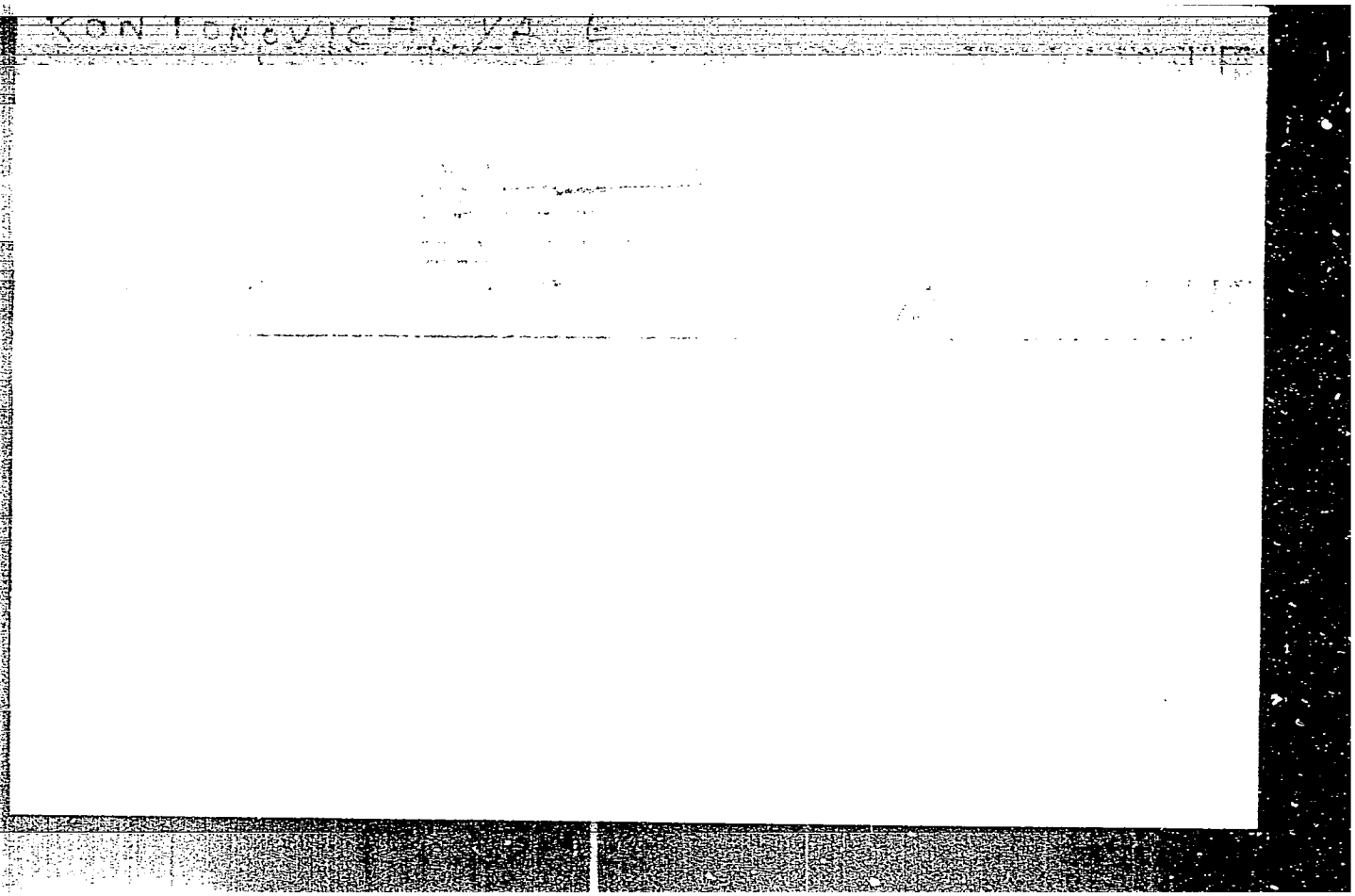
Corrodible Stability of Nitrogen Tarring of Iron Alloys; Works of the Moscow Aviation Technological Institute," Issue No. 4, Defense Industry Publ. House, Moscow, 1948.



Distr: 4E4 27

Carbonator for aluminate and other solutions. E. M. Rubinchik and Ya. E. [illegible]. U S S R 55 020

June 25 1936



KONTOROVICH, Yu. I., Cand Med Sci -- "Simple epiphora. Clinical, diagnostic, and therapeutic problems." Tomsk, 1961. (Tomsk State Med Inst) (KL, 8-61, 261)

KONTOROVICH, Yu.I.

Method for lacrimal patency test. Vest. oft. 74 no.2:53-55 '61.
(MIRA 14:4)

(LACRIMAL ORGANS--DISEASES)

CHEREDNICHENKO, V.M., dotsent; KONTOROVICH, Yu.I., kand.med.nauk.

Rare lesion of the eye caused by the contents of an Aporia crataegi butterfly pupa. Vest. oft. 76 no.1:80-81 Ja-F'63.
(MIRA 16:6)

1. Kafedra glaznykh bolezney (zav. - prof. N.Ye.Braunshteyn) Khar'kovskogo meditsinskogo instituta.

(MYASIS) (EYE--FOREIGN BODIES)

KONTOROVICH, Ye.Kh.

Die casting of stator iron packs without previous joining. Lit. proizv. no.10:44-45 O '63. (MIRA 16:12)

BANIN, A.P.; KONTOROVICH, Z.L.; KRYLOV, Yu.V.

Certain problems involved in the switching of petroleum pipelines.
Neft. khoz. 42 no.2:54-59 F '64. (MIRA 17:3)

KONTOROVICH, Z.L.; BANIN, A.P.; GOLUBNICHIY, V.A.

Depreciation standard for overall repairs of petroleum products pipelines. Transp. i khran. nefti i nefteprod. no. 3:31-37 '64.
(MIRA 17:5)

1. Glavnoye upravleniye po transportu i snabzheniyu neft'yu i nefteproduktami RSFSR.

KONTOROVSKAYA, T.M.

Exoerythrocytic infection in chicks infected with blood containing Plasmodium gallinaceum and treated with acrichine. Med. parasit., Moskva no.1:53-54 Jan-Feb 1953. (CIML 24:4)

1. Of the Institute of Malaria and Medical Parasitology of the Ministry of Public Health Ukrainian SSR (Director of Institute -- I. A. Demchenko).

OVCHINNIKOV, K.M.; MOROZOVSKAYA, M.I.; TISHCHENKO, O.D.; DEMCHENKO, I.A., direktor; NADTOCHIY, S.S.; GORELYSHEVA, I.I.; BEL'SKAYA, M.K.; KONTOROVSKAYA, T.M.; BELYY, Ya.M., zaveduyushchiy; DEREVENKO, V.I.; SHEVCHUK, M.K., zaveduyushchiy; D'YACHENKO, V.I.; SAKOVICH, V.K.; AGAFONOV, I.N., zaveduyushchiy; BESFAMIL'NAYA, P.S.

Prognosis of malarial incidence of a locality and organization of antimalarial measures in the zone of the future Kakhovka reservoir. Med.paraz. i paraz.bol. no.2:109-116 Mr-Ap '53. (MLRA 6:6)

1. Ukrainskiy institut malyarii i meditsinskoy parazitologii imeni professora Rubashkina (for Demchenko). 2. Zaporozhskaya oblastnaya protivomalyariynaya stantsiya (for Belyy). 3. Dnepropetrovskaya oblastnaya protivomalyariynaya stantsiya (for Shevchuk). 4. Khersonskaya oblastnaya protivomalyariynaya stantsiya (for Agafonov).

(Kakhovka reservoir region--Malarial fever)
(Malarial fever--Kakhovka reservoir region)

Kontorovskaya, T.M.

TOROPOVA, M.N.; MOLDAVSKAYA, V.D.; KONTOROVSKAYA, T.M.

Pathohistological changes in experimental malaria in chicks infected with blood and P.gallinaceum sporozoites. Med.paraz. i paraz.bol. supplement to no.1:33 '57. (MIRA 11:1)

1. Iz Ukrainskogo instituta malyarii i meditsinskoy parazitologii i Tsentral'noy psikhonevrologicheskoy bol'nitsy Ministerstva putey soobshcheniya
(MALARIAL FEVER IN BIRDS)

KONTOROVSKAYA, T.M.; BERKOVICH, B.I.; BERKOVICH, Ye.I.

Congenital malaria. Med. paraz. i paraz. bol. 27 no.4:491 Jl-Ag '58.
(MIRA 12:2)

1. Iz Ukrainskogo nauchno-issledovatel'skogo instituta malyarii i medi-tsinskoy parazitologii imeni prof. V.Ya. Rubashkina, Reniyskogo rodil'nogo doma i Reniyskoy rayonnoy malyariynoy stantsii.
(MALARIA, epidemiology,
congen., in Russia (Rus))

KONTOROVSKAYA, T.M.; BEL'SKAYA, M.K.; ARTYUKH, L.G.; GRETSERSHTEYN, I.M. SHUMKVICH, M.V.

Synanthropic flies and their control in a rural populated center in Kharkov Province. Med.paraz. i paraz.bol. 27 no.6:731-732 N-D '58. (MIRA 12:2)

1. Iz Ukrainskogo nauchno-issledovatel'skogo instituta malyarii i meditsinskoy parazitologii imeni prof. V.Ya. Rubashkina.
(KHARKOV PROVINCE--FLIES)

KONTOROVSKIY, M.G.

(2)
4

Chemical Abst.
Vol. 48 No. 4
Feb. 25, 1954
Metallurgy and Metallography

Effects of spheroidization on mechanical properties of low-alloy boiler steels. N. V. Ul'yanova and M. G. Kontorovich. *Izvest. Vsesoyuz. Teplotekh. Inst.* 21, No. 4, 1–7(1952).—Effects of spheroidization, resulting from continuous exposure to high temp. of tempered and normalized (at 900–1050°) low-C and low-Mn steels, are reported.

W. M. Sternberg

1. [illegible], YE. M., [illegible], A. Z.

2. USSR (600)

4. Creep of Metals

7. Automatization of the IP-2 Type machines for the study of creep in metals, Ves. mash. 33 No. 2, 1953.

9. **Monthly List of Russian Accessions**, Library of Congress, June 1953. Unclassified.

КОНТОРОВСКИЙ А. З.

AID P - 679

Subject : USSR/Engineering

Card 1/1 Pub. 29 - 14/24

Author : Kontorovskiy, A. Z., Eng.

Title : Changes of structure and properties of metal in the process of operation in high-pressure steam power stations

Periodical : Energetik, 7, 23-26, Jl 1954

Abstract : Discussion of the results of various mechanical tests and chemical and metallographic analyses of steel subjected to long service at high pressure and temperature in boilers, turbines and piping. Specific attention is given to structural recrystallization, transformation of solid solution of molybdenum and maganese to carbides, spheroidization of perlite and increase of remaining deformation. 10 microphotographs, 5 tables.

Institution : None

Submitted : No date

KONTOROVSKIY, A. Z.

KONTOROVSKIY, A. Z.: "Changes in the structure and properties of metal during exploitation of high-pressure boiler equipment". Moscow, 1955. Min Electric Power Stations USSR. All-Union Order of Labor Red Banner Heat Engineering Sci Res Inst imeni F. E. Dzerzhinskiy. (Dissertations for the degree of Candidate of Technical Science.)

SO: Knizhnaya Letopis' No. 50 10 December 1955. Moscow.

KONTOROVSKIY, A.Z.

KONTOROVSKIY, A.Z., inzhener; RATNER, A.V., kandidat tekhnicheskikh nauk.

Observing the condition of metal of high-pressure pipe lines.
Elek. sta. 26 no.1:50-52 Ja '55. (MLRA 8:3)
(Steam power plants)(Pipe, Steel)

AUTHOR: Kontorovskiy A.Z., Candidate of Technical Sciences.

TITLE: A procedure for investigating graphitisation and evaluation of the degree of its development. (Metodika issledovaniya grafitizatsii i otsenka stepeni ee razvitiya.)

96-7-14/25

PERIODICAL: "Teploenergetika" (Thermal Power), 1957, Vol.4, No.7, pp. 57 - 59.

ABSTRACT: After the bursting of a steam pipe in the Springdale (USA) power station in 1943 a study began to be made of the effect of graphitisation in low carbon and low alloy boiler steel. The pipes burst because of the formation of large inclusions of graphite and util this time graphitisation of low carbon steel was considered very unlikely.

Subsequent investigations carried out in the Soviet Union by N.V. Ul'yanova,, V.I. Prosvirin and others, and abroad, established that graphite formation could occur under certain conditions. The addition of 0.5% molybdenum to the steel retards graphitisation. New types of steel were developed which are also alloyed with 0.5 - 1% of chromium, which appear to be very stable with respect to graphitisation.

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A procedure for investigating graphitisation and evaluation of the degree of its development. (Cont.)

96-7-14/25

Special instructions were laid down by the Ministry of Power Stations concerning observation of the behaviour of metal in service. These provided for the first inspection after 15 000 hours and then every 3 years. Provision was made for a special commission when graphitisation was found and rules were laid down about sampling. No cases of graphitisation were found in Soviet Power stations up to 1954. However, recently, graphitisation has been discovered in three power stations. It has, therefore, become necessary to develop special procedures for determining graphite in steel since it is in some cases difficult to detect graphite in its initial stages. This article describes the procedure developed and applied by the All-Union Thermo-technical Institute to investigate cases of graphitisation. The method makes use of foreign experience.

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The metallographic sections are prepared for examination by lightly etching with a 2% solution of nitric acid in alcohol. The specimens are examined at

KONTOROVSKIY, A.Z.
p. 2

(18)7 PHASE I BOOK EXPLOITATION SOV/1978

ORGRES, trust, Moscow, Byuro tekhnicheskoy informatsii

Metall v sovremennykh energoustanovkakh (Metals in Modern Power Plants) Moscow, Gosenergoizdat, 1958. 75 p. 4,150 copies printed.

Eds.: M.S. Aronovich, Candidate of Technical Sciences, I.K. Korikovskiy; Tech. Ed.: G.Ye. Larionov.

PURPOSE: This collection of articles is intended for designers and process engineers in plants building machinery for power stations.

COVERAGE: Materials for these articles were compiled from investigations carried out at the Otdeleniye metallov Vsesoyuznogo teplotekhnicheskogo nauchno-issledovatel'skogo instituta imeni F.E. Dzerzhinskogo (Department for Metals of the All-Union Heat Engineering Scientific Research Institute imeni F.E. Dzerzhinskiy) from 1950-1955. The following staff members of the Department for

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Metals in Modern Power Plants SOV/1978

Metals VTI participated in the research: D.N. Vidman, R.Ye. Mazel', V.F. Zlepko, A.I. Zakhanova, V.G. Zelenskiy, L.G. Leonova, Engineers; A.I. Sekt, V.N. Gulyayev, Junior scientific workers; L.A. Ilyutina, Ye.P. Denisova, L.Ye. Kornilova, Senior technicians. The behavior of steel used for building machinery and accessories for modern heat power plants with high and superhigh pressure is described and discussed. There are no references.

TABLE OF CONTENTS:

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KONTOROVSKIY, A.Z.

PHASE I BOOK EXPLOITATION SOV/4169

Ekspluatatsionnaya nadezhnost' metalla parosilovykh ustanovok; sbornik statey (Operational Reliability of Metal in Steam Power Plants; Collection of Articles) Moscow, Gosenergoizdat, 1959. 126 p. 2,200 copies printed.

Ed. (Title page): I.N. Laguntsov, Candidate of Technical Sciences; Ed. (Inside book): I.K. Korikovskiy; Tech. Ed.: N.I. Borunov.

PURPOSE: This collection of articles is intended for technical personnel of power stations, power machinery plants, and scientific research institutes.

COVERAGE: The articles set forth the results of investigations that were conducted by Otdeleniye metallov, Vsesoyuznyy teplotekhnicheskiy institut imeni F.E. Dzerzhinskogo (Department of Metals of the All-Union Heat Engineering Institute imeni F.E. Dzerzhinskiy) in the years 1955-57. The articles deal with the problem of investigating new types of steel and of analyzing the causes of damage to certain parts of power plant equipment. Problems associated with operating dependability of welded joints in steam piping for high and extra-high pressure boilers are discussed. The results of investigations of dry pressure "bonding" of metals under high-temperature conditions are given. The reasons for seizure and "baking" together of threaded joints and methods for preventing these phenomena are explained. No personalities are mentioned. References accompany individual articles.

AVAILABLE: Library of Congress

28(5) 05741
AUTHOR: Kontorovskiy, A. Z. SOV/32-25-10-30/63

TITLE: More Precise Definition of Computation of Fatigue Limit Indices

PERIODICAL: Zavodskaya laboratoriya, 1959, Vol 25, Nr 10, p 1232 (USSR)

ABSTRACT: In dealing with the results of tests for fatigue limits, it is not taken into account that the stress increases during the test (on deformation of the sample) which causes a shortening of the period until the sample destruction. Investigations showed that on sample deformation a variation of stress of more than 10% already influences the time until the sample destruction, thus also influencing the gradient of the fatigue limit curve, and the fatigue limit computed. A nomograph is represented (Fig) which permits the increase in stress in the sample, due to an increase in deformation, to be determined. Corresponding equations of computation are also written down. There is 1 figure.

ASSOCIATION: Vsesoyuznyy teplotekhnicheskiy nauchno-issledovatel'skiy institut im. F. E. Dzerzhinskogo (All-Union Scientific Research Institute of Heat Engineering imeni F. E. Dzerzhinskiy)

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34396
S/695/61/000/000/002/005
B139/B104

IP.1151

AUTHORS: Kontorovskiy, A. Z., Moiseyev, A. A.

TITLE: Metal for heating surfaces and steam lines of large boilers

SOURCE: Gorshkov, A. S., V. Ye. Doroshchuk, and N. V. Kuznetsov, eds. Povysheniye parametrov para i moshchnosti agregatov v teploenergetike; sbornik statey. Moscow, Gosenergoizdat, 1961, 103 - 112

TEXT: Perlitic steels used for temperatures of up to 450°C are compiled in Table 1. Aging tests were conducted with tubes from 15Х1М1Ф (15Kh1M1F) steel. After 2000 hrs at 600°C, the structure is the same as at 12000-16500 hrs at 575°C; after that, the strength decreased by 25-30 %. The austenitic steels used are shown in Table 4. Of Soviet steels, ЭИ-726 (EI-726), ЭИ-713 (EI-713) and ЭИ-695Р (EI-695R) have the highest resistance to heat. Tubes from this material were tested in the experimental boiler of the TETs VIT at 220 - 300 atmospheres absolute excess pressure and thermal loads of 20000 - 30000 kcal/m^2·h for 6708 hr. Although a dense oxidation layer of 0.02 - 0.03 mm was formed, no defects occurred. Contraction, elongation and impact strength dropped considerably for all

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Metal for heating surfaces and ...

steels. Carbides were precipitated in the structure, σ and α phases as well as intermetallic compounds were formed in some steels. After 6708 hr, only ЭИ-257Т (EI-257T), ЭИ-695 (EI-695) and ЭИ-448 (EI-448) steels withstood the test for intercrystalline corrosion. Nevertheless, the cheaper 1Х18Н12Т (1Kh18N12T), ЭИ-694 (EI-694) and EI-257T steels may be recommended in the form of tubes for use in power stations with steam parameters of 300 at and 650°C, operational temperature of the metal 600 - 625°C. There are 14 figures and 6 tables.

Table 1. Chemical composition and properties of boiler plate steels. Legend: (1) characteristics; (2) chemical analysis; (3) other elements; (4) yield strength σ_{fl}, kg/mm^2, at yield rate $1 \cdot 10^{-5}$%/h; (5) fatigue strength σ_{df}, kg/mm^2, for 100,000 hr; (6) by calculation; (7) steel brand.

Table 4. Chemical composition of austenitic boiler plate steels in %. Legend: (1) steel brand; (2) maximum; (3) nitrogen; (4) USA steels. Titanium (Ti) is contained up to 0.65 % only in 1Х18Н12Т (1Kh18N12T) steel.

Card 2/2

KONTOROVSKIY, A.Z., kand.tekhn.nauk

Causes for the appearance of cracks in the drum of a steam engine boiler. Prom. energ. 16 no.8:33-34 Ag '61. (MIRA 14:9)
(Steam engines)

3e815

S/137/62/000/004/115/201
A052/A101

18.1150

AUTHOR: Kontorovskiy, A. Z.

TITLE: Investigation of properties of 15Х1М1Ф (15Kh1M1F) commercial boiler steel

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 4,1962, 53, abstract 4I314 ("Ekspluatats. nadezhnost' metalla parosilovykh ustanovok." Moscow-Leningrad, Gosenergoizdat, 1959, 75 - 83)

TEXT: The scope of the investigation included microstructure, mechanical properties at indoor and elevated temperatures, creep and long-time strength, as well as the composition of carbide phase in the state of delivery and after a long-time aging at 575°C of material of 15Kh1M1F steel pipe containing (%) 0.12 C, 0.7 Mn, 0.23 Si, 0.021 S, 0.017 P, 1.04 Cr, 0.9 Mo and 0.25 V. In the state of delivery the steel structure consisted of ferrite, perlite and carbides and was characterized by an irregular grain size within 2 - 6 points. a_k of longitudinal samples was higher than that of lateral ones, and in both cases was high enough (10 - 15 kgm/cm^2). In the state of delivery 40% V and 20% Mo were bound in car-

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S/137/62/000/004/115/201
A052/A101

Investigation of properties of...

bides. Tensile tests at elevated temperatures revealed an increase of σ_s and σ_b and a decrease of δ and ψ at 400 - 450°C which pointed to the tendency of the steel to aging. The extrapolation of the results of long-time strength tests up to 100,000 hour exposure yielded $\sigma^{575}_{100,000} = 6.5$ kg/mm^2 and $\sigma^{600}_{100,000} = 4.0$ - 4.5 kg/mm^2. These data are considerably lower than those taken for the calculation which points to the shortcomings of heat treatment. As a result of aging at 575°C the Mo content in carbides increased 3 times and the V content 2 times after 500 - 1,000 hours. A further aging caused no change in the composition of the carbide phase. Mechanical properties did not change after aging, with the exception of a_k which increased 2.5 times.

N. Kalinkina

[Abstracter's note: Complete translation]

Card 2/2

KONTOROVSKIY, A.Z., kand.tekhn.nauk; GREBENNIKOVA, T.T., inzh.; KURNOSOVA, N.D.,

KONTOROVSKIY, A.Z., kand. tekhn. nauk

Study of the pliability of the welded connections of boiler steel. Teploenergetika 10 no.12:64-65 D '63. (MIRA 17:8)

1. Vsesoyuznyy institut po proyektirovaniyu organizatsiy energeticheskogo stroitel'stva.

S/0096/64/000/001/0013/0018

ACCESSION NR: AP4012337

AUTHORS: Kontorovskiy, A. Z. (Candidate of technical sciences); Vasyuchkova, K. I. (Engineer); Kuznetsova, T. P. (Engineer)

TITLE: Resistance to scaling of boiler steel

SOURCE: Teploenergetika, no. 1, 1964, 13-18

TOPIC TAGS: resistance to scaling, heating cycle, corrosiveness, furnace gas, microstructure, chromium steel, steel 12Kh1MF, steel 15Kh1M1F, steel 12Kh2MFB, steel 12Kh2MFSR, steel EI756, steel 1Kh12V2MF

ABSTRACT: The resistance to scaling of 12Kh1MF, 15Kh1M1F, 12Kh2MFSR, and EI756, 1Kh12V2MF steel specimens (tubes and rings) used in boilers was investigated in great detail, and the composition of each steel was tabulated. The specimens were subjected to cycles of heating (1000, 3000, and 5000 hrs duration) and cooling (for 125 hrs) all done in air. The specimens were weighed before and after each experiment, and the depth of scaling was measured. The results show an intensity of scaling higher than those used in the Leningrad Heat Power Machine Design Congress of 1958. This difference is attributed to the inherently higher corrosiveness of

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KONTOROVSKIY, A.Z., kand.tekhn.nauk; VASYUCHKOVA K.I., inzh.;
KUZNETSOVA, T.P., inzh.

Resistance to scale formation of boiler steel. Teploenergetika
11 no.2:13-18 F '64. (MIRA 17:4)

1. Vsesoyuznyy institut po proyektirovaniyu organizatsiy
energeticheskogo stroitel'stva, Moskovskoye otdeleniye
TSentral'nogo kotloturbinnogo instituta i Vsesoyuznyy nauchno-
issledovatel'skiy teplotekhnicheskiy institut.

ACCESSION NR: AP4025420 S/0096/64/000/004/0034/0037

AUTHORS: Konterovskiy, A. Z. (Candidate of technical sciences); Vasyuchkova, K. I. (Engineer); Kuznetsova, T. P. (Engineer)

TITLE: Aging certain types of boiler steel

SOURCE: Teploenergetika, no. 4, 1964, 34-37

TOPIC TAGS: steel, boiler steel, aging, aging boiler plate, 12KhlMF steel, 12Kh2MFB steel, 12Kh2MFSR steel, 15KhlMlF steel, EI756 steel, steel strength, ordered metal, disordered metal, holding time, metal structure stability, carbide phase variation, plasticity, impact strength, dispersion hardening

ABSTRACT: The variations in the structure and physical properties of boiler steels during aging with relation to holding time at high temperatures (600-650C) were studied. The metals tested were: 12KhlMF, 12Kh2MFB, 12Kh2MFSR, 15KhlMlF, and EI756 steels. Experimental results showed that strength of all the types investigated was impaired by the increase in aging temperature and in the holding time. This effect was more pronounced during the first 500-1000 hours of holding. The authors explain the causes for the variation in metal hardness, plasticity, tensile

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ACCESSION NR: AP4025420

strength, and impact strength under thermal treatments in terms of structural changes due to phase transformation. They emphasize the effect of the alloying elements redistribution in the solid solution and the carbide phase. Steels 12Kh1MF, 15Kh1M1F and EI756 showed a noticeable weakening in the process of aging, while the response of steels 12Kh2MFB and 12Kh2MFSR was insignificant. The variation in physical properties of steel EI756 will require further study before conclusions can be made. Orig. art. has: 2 tables and 5 figures.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 20Apr64 ENCL: 00

SUB CODE: ML NO REF SOV: 001 OTHER: 000

Card 2/2

KONTORSHCHIKOV, A. S.

KONTORSHCHIKOV, A. S. - "Methods of Calculating the Evaporation of Soil Moisture in Fields Used in Agricultural Cultivation." Sub 11 Nov 52, Central Inst of Forecasts. (Dissertation for the Degree of Candidate in Geographical Sciences).

SO: Vechernaya Moskva January-December 1952

KONTORSHCHIKOV, A. S.

"Computation of Evaporation From the Soil".
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It is established that in years with enhanced reserves of moisture and with small precipitation the evaporation as computed in accordance with the graphs of B. V. Polyakov (Trudy Tsentr. in-ta prognozov, No 4, 1947) strongly doffers from the evaporation as computed in accordance with the method of water-balance of soil. The author assumes that for definite reserves of active moisture W and for precipitation X the quantity of evaporation will be approximately the same as when precipitation is absent but soil moisutre quantitatively equals W+X. In place of the four graphs of Polyakov the author constructs one graph of the family of curves W+X expressing the sum of reserves of soil moisture and quantity of precipitation. He recommends use of this graph for forecasting of total evaporation from a rover basin. It gives improved results. (RZhGeol, No 9, 1955)

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Inst : The Central Forecasting Institute.

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(Meteorology, Agricultural)