"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

L 33599-66 EWT(1)

ACC NR: AR6016205 SOURCE CODE: UR/0058/65/000/011/D036/D037

45
B

AUTHORS: Zhiglinskiy, A. G.; Kochemirovskiy, A. S.; Putilin, E. S.

TITLE: Vibrational spectrum of single-crystal Rochelle salt in polarization of light along three principal crystallographic directions at T = 293K and 20K

SOURCE: Ref. zh. Fizika, Abs. 11D282

REF SOURCE: Tr. Komis. po spektroskopii. AN SSSR, t. 3, vyp. 1, 1964, 595-603

TOPIC TAGS: absorption spectrum, light polarization, absorption band, potassium compound

ABSTRACT: The vibrational absorption spectrum of single-crystal Rochelle salt exhibits a strong variation with the temperature. This variation is manifest in a change of the intensity of the absorption bands and their shift, the appearance of new bands, and disappearance of old ones. A different behavior of polarized absorption bands is observed in different planes. [Translation of abstract]

SUB CODE: 20

Card 1/1

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGLINSKIY, A.G.; ZAYDEL', A.N.; KUND, G.G.

Spectrum analysis of Pb^{204}. Geokhimiia no.1:88-91 Ja '63. (MIRA 16:9)

1. Leningradskiy gosudarstvennyy universitet.
(Lead isotopes--Spectra)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

S/054/63/004/001/006/022
B102/B186

AUTHORS: Zhiglinskiy, A. G., Kochemirovskiy, A. S.

TITLE: Determination of isotopic composition from the emission spectrum of molecules

PERIODICAL: Leningrad. Universitet. Vestnik. Seriya fiziki i khimii, no. 1, 1963, 47-54

TEXT: Accuracy and reproducibility of isotope analyses with the help of atomic spectra, rotational or vibrational spectra of molecules depend on the relation between concentration ratio and intensity ratio. In the ideal case, $C_1/C_2 = I_1/I_2$. Numerous possible causes for deviation from the ideal relation are discussed (isotope separation, differences in the degree of molecular dissociation, self-absorption, background etc.). In the case of atomic spectra the high homologicity of the spectral lines is the main cause of the deviation. For molecular spectra it is less high. Here the physical principles of an analysis according to the band edges of the electron vibrational spectra of biatomic molecules and according to the lines of the rotational spectra are discussed with special consideration

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of the factors which affect the degree of homologicity. In the light of the BO molecule ($B^{10}O+B^{11}O$) the possibilities of raising the accuracy in such analyses are discussed. There are 3 figures.

SUBMITTED: July 9, 1962

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGLINSKIY, A.G.; ZAYDEL', A.N.; PETROV, A.A.

Spectral analysis of isotopic composition (survey). Zav.lab. 29 no.5:550-552 '63. (MIRA 16:5)

(Isotopes—Spectra)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZAYDEL', A.N.; ZHIGLINSKIY, A.G.; KUND, G.G.

Isotope spectrum analysis. Biul.Kom.po opr.abs.vozr.geol.form. no.5:60-62 '62. (MIRA 15:11)
(Geological time) (Spectrum analysis)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

S/169/62/000/012/006/095
D228/D307

AUTHORS: Zaydel', A.N., Zhiglinskiy, A.G., and Kund, G.G.

TITLE: Isotopic spectral analysis

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 12, 1962, 10, abstract 12A80 (Byul. Komis. po opredeleniyu absolyutn. vozrasta geol. formatsiy, AN SSSR, no. 5, 1962, 60-62)

TEXT: The most prevalent, accurate, sensitive and universal method of mass-spectrometrically determining isotopic composition involves various difficulties of principle and technique. Spectral methods based on the differences existing in the atomic and molecular spectra of different isotopes employ the simpler equipment and require less time. Methods of spectrally determining the isotopic composition have been employed for a series of elements. The authors are now working on new methods for determining the isotopic composition of magnesium and oxygen. Equipment with a resolving power of up to 106 for studying atomic spectra generally con-

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

Isotopic spectral analysis

S/169/62/000/012/006/095
D228/D307

sists of a light source (hollow cathode, high-frequency discharge tube), a pre-analyzing monochromator, a Fabri-Pero interferometer, and a photoelectric recording photometer. This apparatus determines the isotopic composition with a precision of from tenths of a percent to several percent of the specific concentration. Equipment for determining the isotopic composition from molecular spectra does not require an interferometer but usually contains a spectrograph with a resolving power of $\sim 10^4$; an arc serves as the light source. A new method is used for determining the isotopic composition of hydrogen and uranium, based on the measurement of the vapor with isotopic composition. Determinations of the isotopic composition of strontium carried out by the authors gave an accuracy of 3-5%, and lasted about $1\frac{1}{2}$ hours. Work by the authors on improving the isotopic composition of lead increased the measurement accuracy for all isotope concentrations by 2-3% of the content of each isotope. 27 references.

[Abstracter's note: Complete translation]

Card 2/2

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZAYDEL', A.N.; ZHIGLINSKIY, A.G.; KARKLINA, E.A.

Study of a d.c. current arc at elevated pressure. Izv. AN SSSR. Ser. fiz. 26 no.7:855-857 Jl '62. (MIRA 15:8)
(Electric arc--Spectra)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

S/048/62/026/007/002/030
B104/B138

AUTHORS: Zaydel', A. N., Zhiglinskiy, A. G., and Karklina, E. A.

TITLE: Study of the direct-current arc at elevated pressure

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 7, 1962, 855-857

TEXT: A previous paper (A. N. Zaydel' et al., Optika i spektroskopiya, 2, 28 (1957)) contains the description of an experimental system designed to study Li and Cu spectra in dependence on the pressure of the atmosphere surrounding the arc. At a surrounding CO_2 pressure of 7 atm. the Li I 6707, Li I 6103, Cu I 3274, and Cu I 3247 lines have much greater intensity than at 1 atm. The relative intensity of the Li lines was 11 times higher than that of the background. The plasma temperature is assumed to increase with pressure. The ratio between the emitting atom-molecule collision cross sections does not depend on pressure, and the optical density of the layer absorbing the two Li lines remains unaltered. Thus, the light source described in the previous paper provides a means for improving the accuracy of spectral analyses.

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGLINSKIY, A.G.; ZAYDEL', A.N.; KARKLINA, E.A.

Study of a direct current arc at elevated pressure. Opt. i spektr. 10 no.6:697-701 Je '61. (MIRA 14:8)
(Electric arc)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGLINSKIY, A.G.; ZAYDEL', A.N.; KUND, G.G.

Autocollimation setup for the photoelectric recording of hyperfine structure. Opt. i spektr. 10 no.6:792-796 Je '61. (MIRA 14:8)

(Interferometry) (Photoelectric measurements)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGLINSKIY, A.G.; KUND, G.G.

Spectral determination of the isotopic composition of strontium.
Opt. i spektr. 7 no. 6:836-837 D '59. (MIRA 14:2)
(Strontium—Isotopes)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

67161
SOV/51-7-6-29/38

24.6700

AUTHORS: Zhiglinskiy, A.G. and Kund, G.G.

TITLE: On the Spectral Determination of the Isotopic Composition of Strontium

PERIODICAL: Optika i spektroskopiya, 1959, Vol 7, No 6, pp 836-837 (USSR)

ABSTRACT: Strontium has four stable isotopes with atomic weights of 84, 86, 87 and 88. Sr^{87} is formed by β-decay of Rb^{87} and consequently the amount of the former is related to the ratio Rb/Sr and the age of the minerals from which a particular sample was obtained. Consequently the ratio of the relative abundance of Sr^{87} with respect to that of the even isotopes of strontium is used to determine the geological age of rocks (Ref 1). Isotopic displacements of the spectral lines of strontium are so small that the lines of the even isotopes merge together while the line of Sr^{87}, whose nucleus has a spin of $I = 9/2$, has a clear hyperfine structure (Ref 2). This makes it possible to determine the relative proportions of the even and the odd isotopes of Sr by measuring the ratio of the intensities of the line representing the three even isotopes and the components of the Sr87 line. For this purpose the hyperfine structure was recorded photoelectrically employing the apparatus used for studies of the isotopic structure of lead (Ref 3). An Sr II line at 4078 Å, corresponding to the transition $^2S_{1/2}$--$^2P_{3/2}$ was used. The hyperfine structure of this line is due to

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67161

On the Spectral Determination of the Isotopic Composition of Strontium SOV/51-7-6-29/38

splitting of the term $^2S_{1/2}$, which amounts to 0.158 cm^{-1} (Ref 2) and is shown schematically in Fig 1. Separation between etalons (32 cm) was such that the A and B h.f.s. components (Fig 1) of the consecutive orders were superimposed. A typical recording of the 4078 Å line structure is shown in Fig 2 for a sample with 40% of Sr^{87} (the reflectivity of the etalon mirrors was 80%). Partial superposition of the line contours of the even and odd isotopes is due to insufficient resolution of the etalon and due to Doppler broadening of the lines. For this reason the authors used a calibration graph and to construct it they employed samples whose composition was known precisely from mass-spectrographic measurements. The calibrating graph departed strongly from a straight line especially in the region where the amount of Sr^{87} was close to 7% (7% is the lower limit of Sr^{87} concentration in natural strontium). The graph was constructed for concentrations of 7.0-52.6% Sr^{87} using six standards with 7.03, 15.0, 20.0, 30.0, 40.0 and 52.6% of Sr^{87}. In analyses of samples with 15-50% Sr^{87} the relative error amounted to 2-3%, while in the case of samples with 7-15% Sr^{87} the error rose to 5-7%. Acknowledgments are made to

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

67161

On the Spectral Determination of the Isotopic Composition of Strontium SOV/51-7-6-29/38

A.N. Zaydel' for his advice and to I. Ye. Starik and V.S. Zolotarev for supplying separated strontium isotopes. There are 2 figures and 3 references, 2 of which are Soviet and 1 German.

SUBMITTED: July 8, 1959

4

Card 3/3

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGLINSKIY, A.M.

Improving the electric circuit of a multiple-saw machine. Sbor.vnedr. rats.pred. v les. i meb.prom. no.2:161-165 '59. (MIRA 13:8)

1. Leningradskiy lesopil'no-derevoobrabatyvayushchiy kombinat.
(Saws--Electric driving)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

KOVALEV, I.A.; ZHIGLOV, Yu.S.

Spectral determination of traces of silicon in sodium iodide. Zav.lab. 29 no.2:179 '63. (MIRA 16:5)

1. Khar'kovskiy filial Vsesoyuznogo nauchno-issledovatel'skogo instituta khimicheskikh reaktivov.
(Sodium iodide) (Silicon—Spectra)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

HUNGARY / Chemical Technology. Processing of Solid Fuels H-22

Abs Jour : Ref Zhur - Khim., No 12, 1958, No 40909

Author : Zhigmond
Inst : Not given
Title : Manufacture of Briquettes

Orig Pub : Magyar energiagazd., 1955, 8, No 9, 340-350.

Abstract : No abstract.

Card 1/1

3

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGMUNT, V.M.

USSR/Miscellaneous - Communications

Card 1/1 Pub. 133 - 10/23

Authors : Zhigmunt, V. M., Acting Representative of the Ministry of Communications for BSSR (Bielorussian Soviet Socialist Republic)

Title : Utilization of resources available in the communications services

Periodical : Vest. svyazi 8, page 16, Aug 1954

Abstract : A system for utilizing, to a greater degree, the available communications manpower and equipment is proposed. Examples of this system, adopted in certain districts of the Bielorussian Republic, are cited. A number of central radio transmitting stations, installed in telephone and telegraph offices, were serviced by the telephone and telegraph personnel experienced in radio work, thus avoiding the necessity of hiring extra technicians. Examples of economy obtained and services improved through better utilization of equipment are referred to.

Institution : ...

Submitted : ...

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

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ASSOCIATION

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

L 26593-66 EWT(1)

ACC NR: AP6011413 SOURCE CODE: UR/0021/66/000/003/0286/0291

AUTHOR: Naumov, A. L.; Zhygots'ka, N. I.--Zhigotskaya, N. I.

ORG: Kiev State University (Kyyivs'kyy derzhavnyy universytet)

26
B

TITLE: Approximate method of determining forced oscillations described by certain nonlinear differential equations

SOURCE: AN UkrRSR. Dopovidi, no. 3, 1966, 286-291

TOPIC TAGS: nonlinear differential equation, oscillation, approximate solution, harmonic oscillation

ABSTRACT: This is a continuation of earlier work by the authors (Izv. vyssh. uch. zaved. elektromekhanika No. 1, 3, 1965), where an approximate method was developed for obtaining nonlinear differential equations (or systems of linear differential equations with nonlinear coefficients) describing forced oscillations. The present article is devoted to an analysis of the solutions obtained there with an aim at determining the accuracy of the equation. The particular differential equation analyzed is

$$L\frac{d^2q}{dt^2}+r\frac{dq}{dt}+\frac{q}{C}+\beta f(q,\dot{q})=u, \qquad (1)$$

where r, L, and C are constant coefficients, u a specified sinusoidal function of the time ($u = U_m\sin(\omega t) + \alpha$), and f is a power function of q and $\dot{q}$, and possibly of higher

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L 26593-66

ACC NR: AP6011413

order derivatives; β is a small parameter. It is proved that by adding to the simusoidal solution $q = q_m \sin(\omega t)$ a higher harmonic, it is possible to choose the amplitude of this harmonic in such a way that a harmonic of the same order occurs in the expansion of the specified function of the time. At this amplitude all the higher harmonics vanish with accuracy β^2. The limits of applicability of this method are discussed. This report was presented by Academician of AN UkrSSR Yu. O. Mytropol's'kyy (Yu. A. Mitropol'skiy). Orig. art. has: 15 formulas.

SUB CODE: 12, 20/ SUBM DATE: 29Apr65/ ORIG REF: 002

Card 2/2 BLG

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

NAUMOV, Adol'f L'vovich, doktor tekhn. nauk, prof.; ZHIGOTSKAYA, Natal'ya Ivanovna, aspirantka

Electric transformer as a nonlinear electric circuit with ferromagnetic losses. Izv. vys. ucheb. zav.; elektromekh. 8 no.1:3-12 '65. (MIRA 18:3)

1. Zaveduyushchiy kafedroy teoreticheskoy mekhaniki Kiyevskogo gosudarstvennogo universiteta (for Naumov). 2. Kafedra teoreticheskoy mekhaniki Kiyevskogo gosudarstvennogo universiteta (for Zhigotskaya).

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

SOLOMKO, V.P.; ZHIGOTSKIY, A.G. [Zhyhots'kyi, O.H.]; USKOV, I.A. [Uskov, I.O.]; KUCHINKA, M.Yu. [Kuchynka, M.IU.]

Study of the mechanical properties of filled polymers. Part 2. Effect of rate of deformation on the mechanical properties of polystyrene, polymethylmetacrylate, and polyethylene filled with vitreous fibre. Ukr. fiz. zhur. 10 no.5:549-557 My '65. (MIRA 18:5)

1. Kiyevskiy gosudarstvennyy universitet im. Shevchenko.

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

SOLOMKO, V.P.; ZHIGOTSKIY, A.G. [Zhyhots'kyi, O.H.]; USKOV, I.A. [Uskov, I.O.]; KUCHINKA, M.Yu. [Kuchynka, M.IU.]

Mechanical properties of filled polymers. Part 1: Mechanical properties of polystyrene, polymethylmetacrylate, and polyethylene filled with glass fibers. Ukr. fiz. zhur. 10 no.2:211-218 F '65. (MIRA 18:4)

1. Kiyevskiy gosudarstvennyy universitet im. Shevchenko.

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

SOLOMKO, V.P., kand. khimich. nauk, dotsent; USKOV, I.A., kand. khimich. nauk, dotsent; ZHIGOTSKIY, A.G., inzh.; NIZHNIK, V.V., inzh.

Studying the reaction of fibrous materials with polymer binders. Izv. vys. ucheb. zav.; tekh. leg. prom. no.3:23-29 '63. (MIRA 16:7)

1. Kiyevskiy Ordena Lenina gosudarstvennyy universitet imeni Shevchenko. Rekomendovana kafedroy fizicheskoy i kolloidnoy khimii.

(Polymers) (Textile fibers, Synthetic) (Fillers)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

character of deformation in the

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ACC NR: AT7006297 (N) SOURCE CODE: UR/0000/66/000/000/0153/0162

AUTHOR: Solomko, V. P.; Zhigotskiy, A. G.; Uskov, I. A.

ORG: none

TITLE: Mechanical properties of polymer films filled with glass and viscose fiber

SOURCE: AN UkrSSR. Sintez i fiziko-khimiya polimerov (Synthesis and physical chemistry of polymers). Kiev, Naukova dumka, 1966, 153-162

TOPIC TAGS: glass fiber, viscose, polystyrene, polymethylmethacrylate, polyethylene, polyvinyl alcohol, polyvinyl acetate, polyvinyl butyral

ABSTRACT: The authors studied the dependence of the mechanical properties (breaking stresses σ_b and breaking elongations σ_b) of polystyrene, polymethyl methacrylate, polyethylene, polyvinyl alcohol, polyvinyl butyral and polyvinyl acetate on the concentration of viscose fiber, and the dependence of the same properties of polyvinyl alcohol, polyvinyl butyral and polyvinyl acetate on the concentration of glass fiber up to 20 wt. % inclusive at deformation rates of 0.3, 3 and 30 mm/min. Depending upon the nature of the polymer, the introduction of the fiber either increases or decreases σ_b as the filler concentration rises, while ϵ_b declines. In all cases, films filled with glass fiber are characterized by a higher strength than films filled with viscose fiber. The nature of the dependence of σ_b on the fiber concentration is the same for both types of fibers. The mechanical properties of the

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ACC NR: AT7006297

filled polymer films are much more sensitive to changes in the deformation rate than those of unfilled films. As a rule, a decrease in the deformation rate in the range of rates studied leads to an increase of σ_b and decrease of ϵ_b in unfilled polymer films. The data obtained are explained in terms of the relaxational character of the deformation of filled polymers, the kinetics of development of defects, and the reinforcing role of the three-dimensional structural network formed by the fiber in the polymer medium. Orig. art. has: 6 figures and 3 tables.

SUB CODE: 11/ SUBM DATE: none/ ORIG REF: 019

Card 2/2

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

USKOV, I.A.; ZHIGOTSKIY, A.G.

Heat resistant electric insulating films from betonite. Bent. gliny Ukr. no.3:163-167 '59. (MIRA 12:12)

1. Kiyevskiy gosudarstvennyy universitet.
(Electric insulators and insulation)
(Bentonite)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

SOLOMKO, V.P.; POLETUKHA, V.V.; USKOV, I.A.; ZHIGOTSKIY, A.G.

Interaction of polymers with fibrous fillers. Part 1: Polystyrene and polymethacrylate filled with glass fiber. Ukr. khim. zhur. 30 no.3:305-308 '64. (MIRA 17:10)

1. Kiyevskiy gosudarstvennyy universitet im. T.G. Shevchenko.

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

... v. 30, 305, 1964; Izv. vuzov, Tekhn. legk. prom. no. 5, 11, 1964).

Card 1/2

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ACCESSION NR: AP4022112 S/0073/64/030/003/0305/0308

AUTHOR: Solomko, V. P.; Poletukha, V. V.; Uskov, I. A.; Zhigotskiy, A. G.

TITLE: Interaction of polymers with fibrous fillers

SOURCE: Ukrainskiy khimicheskiy zhurnal, v. 30, no. 3, 1964, 305-308

TOPIC TAGS: filled polymer, fiberglass filler, polystyrene, polymethylmethacrylate, filled polystyrene, filled polymethylmethacrylate, softening temperature, fiberglass polymer compatibility, fiberglass polymerophilicity, silicone treated fiberglass

ABSTRACT: The effect of fiberglass filler concentration of the softening temperature of polystyrene (PS) and polymethylmethacrylate (PMMA) of different molecular weights (PS-80,000, PMMA-720,000) was investigated. Introduction of fiberglass (7 microns diameter, 3 microns long delubricated at 450C for 3 hours) into the polymer films significantly raised their softening temperatures, even at low filler concentrations: the effect being greater in PMMA than in PS (compare

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ACCESSION NR: AP4022112

figs. 1 and 2). This is attributed to the greater similarity in polarity and the possibility of hydrogen bond formation between the PMMA and the fiberglass. The addition of fiberglass treated with organosilicon compounds to PS film causes a more significant increase in its softening temperature (by 8-10C) in comparison with PS film filled with untreated glass. This is attributed to increasing the polymerophilicity of the fiberglass and its compatibility with polymers. Orig. art. has: 2 figures

ASSOCIATION: Kievskiy gosudarstvenny*y universitet im. T. G. Shevchenko (Kiev State University)

SUBMITTED: 09Feb63 DATE ACQ: 09Apr64 ENCL: 02

SUB CODE: MT NO REF SOV: 009 OTHER: 000

Card 2/4

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGLINSKIY, A.M.

Automatic cut-out of the electric motors of exhaust units when the belt conveyer stops. Sbor.vnedr.rats.pred. v les. i meb.prom. no.2: 156-160 '59. (MIRA 13:8)

1. Leningradskiy lesopil'no-derevoobrabatyvayushchiy kombinat.
(Conveying machinery--Electric driving)
(Electric switchgear)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGOTSKIY, N.

Medical associations of Maksim Gor'kii in Nizhniy Novgorod. Zdrav. Bel. 7 no. 2:62-64 F '61. (MIRA 14:2)
(GOR'KII, MAKSIM, 1868-1936)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGOTSKIY, N. [Zhyhotski, N.] (Pushkinskiye gory, Pskovskoy oblasti)

Pushkinskiye Gory. Hab. i sial. 35 no.6:18 Je '59.
(MIRA 12:8)

(Pushkin, Aleksandr Sergeevich, 1799-1837--Homes and haunts)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGULA, A.V.; KOROTKOV, G.I.; KUCHERENKO, V.G.; GLUSHCHENKO, A.S.; POLTORAK, P.A.

Semiautomatic cutting of thick sheet. Metallurg 10 no.6:32 Je '65. (MIRA 18:6)

1. Zavod im. Il'icha i Donetskiy sovet narodnogo khozyaystva.

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

S/135/60/000/006/004/007
A104/A029

AUTHORS: Antonets, D.P.; Zhigula, A.V.; Polotskiy, R.G., - Graduate Engineers

TITLE: Production Line for Welding of 60 m^3 Capacity Railroad Tank Cars

PERIODICAL: Svarochnoye proizvodstvo, 1960, No. 6, pp. 14 - 17

TEXT: The authors describe the production method of steel butt-welded railroad tank cars of 61.2 m^3, inner diameter 2,800 mm and 10,300 mm long with no frame bumpers or side channel bars. The production line was developed in 1957 - 58 by the Zhdanovskiy zavod tyazhelogo mashinostroyeniya (Zhdanov Plant of Heavy Machine Building) in cooperation with the VPTI Leningradskogo Sovnarkhoza (Leningrad Sovnarkhoz VPTI). There are three parallel production lines with 14 points each. The tank is made of a 9,280 x 8,820 mm sheet assembled of five smaller sheets. The production process and equipment used are described. The installation in which welding of one side of the metal sheet is carried out, a general view of the tilter and the butt-welding unit are shown. The inside seams are welded with a mobile TC-17M (TS-17M) welder and the outside seams with an ABC (ABS) welding head. The bottoms of the tanks are fitted on a special welding stand. Finished seams are subjected to radioactive cobalt tests, after which var-

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

S/135/60/000/006/004/007
A104/A029

Production Line for Welding of 60 m^3 Capacity Railroad Tank Cars

ious parts are attached or welded to it. Hydraulic tests up to 4 atm are performed by filling the tank with water. The general assembly conveyer consists of 16 sections, on which the tanks are completed. An automatic welding unit is used for welding the tank fitting claws. There is 1 table and 7 figures.

ASSOCIATION: Zhdanovskiy zavod tyazhelogo mashinostroyeniya (Zhdanov Plant of Heavy Machine Building)

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

YEFIMOV, V.A., doktor tekhn. nauk; KUZEMA, I.D., kand. tekhn. nauk; ZHIGULA, A.V., inzh.; SAPKO, V.N., inzh.; KISSEL', N.N., inzh.; CHERNYSHEV, I.S., inzh.; ZARUBIN, N.G., inzh.; STRYAPIN, I.Ya., inzh.; OLESHKEVICH, T.I., inzh.; SONIN, G.V., inzh.; PUKALOV, V.P., inzh.

Rapid top pouring of rimmed steel from ladles with a capacity from 350 to 480 tons. Stal' 24 no.1:30-32 Ja '64. (MIRA 17:2)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ANTONETS, D.P., inzh.; ZHIGULA, A.V., inzh; POLOTSKIY, R.G., inzh.

Assembly line for the manufacture of 60 m^3 welded tanks. Svar. proizv. no.6:14-17 Je '60. (MIRA 13:7)

1. Zhdanovskiy zavod tyazhelogo mashinostroyeniya.
(Assembly line methods) (Tanks--Welding)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

CHEPIGO,S.V.; ZHIGULENKO,L.N.; BANNIKOVA,A.A.

Production of active carbon-collactivite from hydrolysis lignin. Gidroliz. i lesokhim. prom. 8 no.3:12-14 '55. (MIRA 8:9)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut gidroliznoy i sul'fitno-spirtovoy promyshlennosti

(Carbon, Activated)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

CHEPIGO, S.V.; ZHIGULENKO, L.N.; IGNATYUK, A.G.; BANNIKOVA, A.A.

Characteristics and properties of active "kollaktivit" coal. Gidroliz. i lesokhim. prom. 10 no.3:8-10 '57. (MLRA 10:5)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut gidrolisnoy i sul'fitno-spirtovoy promyshlennosti.
(Coke--Analysis)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

SHUL'GIN, V.N., insh.; ZHIGULENKO, L.N., nauchnyy sotrudnik; IVANOV, V.I., doktor tekhn.nauk

Production of woodpulp by alkaline chlorination. Bum.prom. 34 no.8:2-5 Ag '59. (MIRA 12:12)

1. Gosplan SSSR (for Shul'gin). 2. Institut organicheskoy khimii AN SSSR im Zelinskogo (for Zhigulenko, Ivanov).
(Woodpulp)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGULEV, N. M.

"Technical and Economic Indexes of Moscow Cable Network and Basic Operating Characteristics," "Operation of Cable Networks" (Ekspluatatsiya kabeley i kabel'nykh setey), Gosenergoizdat, 1949, 384 pp.

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

CHERNOV, N.N., kand.tekhn.nauk dots.; ZHIGULEV, P.G., inzh.; YEGOROV, A.F., inzh.; KARACHENTSEV, M.D., inzh.

Technology of making foundry iron in blast furnaces of the Kuznetsk Metallurgical Combine. Izv.vys.ucheb.zav.; chern. met. 2 no.8:21-29 Ag '59. (MIRA 13:4)

1. Dneprodzerzhinskiy vecherniy metallurgicheskiy institut i Kuznetskiy metallurgicheskiy kombinat. Rekomendovana kafedroy metallurgii chernykh metallov Dneprodzerzhinskogo vechernego metallurgicheskogo instituta.
(Stalinsk--Blast furnaces)
(Foundries--Equipment and supplies)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

SOV/133-58-12-4/19

AUTHORS: Chernov N.N., (Candidate of Technical Science), Docent, Zhiguley P.G., Baranovskiy P.G., Obsharov, V.M., Rayev, Yu. O., and Kargin A.A., (Engineers).

TITLE: An Automatic Control of the Operation of a Blast Furnace Based on the Drop in Static Pressure (Avtomaticheskoye regulirovaniye khoda domennoy pechi po perepadu staticheskogo davleniya)

PERIODICAL: Stal', 1958, Nr 12, pp 1071-1077 (USSR)

ABSTRACT: The Central Automation Laboratory designed experimental equipment for the automatic control of blast furnace operation based on the pressure drop between the bustle pipe and furnace throat. The signal from the differential manometer acted in turn on the following controls: top pressure, temperature and humidity of blast, blast volume. The equipment was tested on a furnace in the Zaporozhstal' Works in 1954 and on the Kuznetsk Metallurgical Combine in 1956. It was soon found that the system as designed was unworkable. The investigations carried out in the Kuznetsk Combine indicated that changes in top pressure influence mainly the pressure drop between the throat and the middle of the stack, and changes in the blast

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SOV/133-58-12-4/19

An Automatic Control of the Operation of a Blast Furnace Based on the Drop in Static Pressure

humidity, blast temperature and blast volume affect mainly the pressure drop between the middle of the stack and tuyere level. It was therefore decided to base the automatic control on partial pressure drops between the tuyere level and the middle of the stack and between the middle of the stack and the throat. These partial drops in static pressure were measured with two DPES type differential manometers with a double electronic bridge (two standard electronic bridges operating on to a common recording strip). The reliability of the operation of this equipment depends mainly on the state of the opening in the furnace stack for measuring static pressure. This was successfully solved by arranging the opening through a cooler and cleaning it by a pneumatically operated rod (Figs 1 and 2). The recorded curve of the pressure drop between the above two levels during normal furnace operation is shown in Fig 3; during top hanging of the burden in Fig 4; during bottom hanging in Fig 5, and when the hearth is filled with iron and

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SOV/133-58-12-4/19

An Automatic Control of the Operation of a Blast Furnace Based on the Drop in Static Pressure

slag, Fig 6. After preliminary investigation of the influence of the individual operating factors on the partial pressure drops a scheme for the automatic control was evolved, the electrical circuit diagram of which is given in Fig 7. If the top pressure drop exceeds a certain value then the controls will bring about a certain increase in the top pressure. If after some predetermined time the top pressure drop is not returned to its normal value then the blast volume will decrease by increments with a certain time interval between each increment. When a complete permitted correction of the blast volume is made, the controller of the bottom pressure drop is put into operation and begins to correct the temperature or humidity and volume of the blast. As a result of the above corrections the pressure drop may be restored to the required value. If the bottom pressure drop does not exceed normal value, then the blast volume begins to increase until it is returned to normal value and is then followed by the restoration of the top pressure. If the

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SOV/133-58-12-4/19

An Automatic Control of the Operation of a Blast Furnace Based on the Drop in Static Pressure

bottom pressure drop exceeds the normal value then the controller of the top pressure drop is not permitted to restore normal operating conditions, but instead the controller of the bottom pressure drop begins to introduce corrections at first of blast temperature or moisture (in stages of 20°C and 2g/m^3) and then of the blast volume. Between each correction a time interval of 5 - 7 minutes is maintained. The restoration of the normal operating conditions is done in reverse order. If the pressure drop falls below the predetermined value, then at first either the blast temperature is increased or its humidity decreased and then the blast volume is

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

SOV/133-58-12-4/19

An Automatic Control of the Operation of a Blast Furnace Based on the Drop in Static Pressure

increased. The system was tested during a period of two weeks and in the great majority of cases gave the correct solutions.
There are 7 figures.

ASSOCIATION: Sibirskiy metallurgicheskiy institut i Kuznetskiy metallurgicheskiy kombinat (Siberian Metallurgical Institute and Kuznetsk Metallurgical Combine)

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

DEMBOVETSKIY, V.P.; YEFIMENKO, G.M.; OBSHAROV, V.M.; ZHIGULEV, P.G.

Distribution of the temperature of the gas flow in a charge layer during various charging conditions. Izv. vys. ucheb. zav.; chern. met. 7 no.8:35-39 '64. (MIRA 17:9)

1. Sibirskiy metallurgicheskiy institut.

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHEREBIN, B.N.; DEMBOVETSKIY, V.P.; MINKIN, V.M.; NIKULINSKIY, I.D.; Prinimali uchastiye: OBSHAROV, V.M., inzh.; RAYEV, Yu.O., inzh.; ZHIGULEV, P.T., inzh.; SUCHKOV, I.A., inzh.; BEREZKIN, B.S., inzh.; NEKRASOV, V.M., inzh.; ZHUKOVICH, A.I., inzh.

Use of coke-oven gas in blast furnaces. Stal' 21 no.8:673-679 Ag '61. (MIRA 14:9)

1. Kuznetskiy metallurgicheskiy kombinat i Sibirskiy metallurgicheskiy institut.
(Blast furnaces—Equipment and supplies)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5"

"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGULEV, V.

Anti world. Znan.-sila 38 no.4:40-43 Ap '63.
(MIRA 16:8)

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGULEV, V.A.

"Some Magneto-Fluid Dynamic Effects in a Medium with Finite Conductivity."

report presented at the Intl Symposium on Magneto-Fluid Dynamics, Wash.,D.C.,17-23 Jan 60.
Comments - B 3,151,585, 24 Feb 1960.

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ZHIGULEV, V.N.

SUBJECT USSR/MATHEMATICS/Differential equations CARD 1/4 PG - 585
AUTHOR ZIGULEW V.N.
TITLE On a class of plane and axialsymmetric flows near the sound velocity.
PERIODICAL Priklad.Mat.Mech. 20, 613-620 (1956)
reviewed 2/1957

The equations of axialsymmetric and plane flows near the sound velocity have, as it is well-known, the following form:

$$(1) \qquad -u\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} + \delta\frac{v}{y} = 0, \qquad \frac{\partial u}{\partial y} = \frac{\partial v}{\partial x}.$$

Here u and v are relative deviations from a_∞ in the direction of the x- and y-axis respectively; a_∞ - velocity of sound in the direction of the x-axis, u and v are referred to the magnitude $\frac{a_\infty}{\varkappa+1}$, $\varkappa$ - adiabatic exponent; $\delta = 0$ for plane flow, $\delta = 1$ for axialsymmetric flow (x - symmetry axis). The author seeks solutions of (1) which satisfy the conditions

$$(2) \qquad u = u_1(x)\cdot u_2(y) \qquad v = v_1(x)\cdot v_2(y).$$

Under there assumptions a system of ordinary differential equations is obtained

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for the determination of $u_1(x)$, $u_2(y)$, $v_1(x)$ and $v_2(y)$. The functions u_1 and v_1 for $\delta = 0$ and $\delta = 1$ and the functions u_2 and v_2 for $\delta = 0$ can be represented without difficulties in closed form by elliptic integrals and their inverse functions. The dependence $u_2 = u_2(y)$ for $\delta = 1$ is more complicated, it holds

$$\frac{d^2u_2}{dy^2} + \frac{1}{y}\frac{du_2}{dy} = u_2^2 . \tag{3}$$

The author states: 1) if $y_0 > 0$, $u_2'(y_0) = \left(\frac{du_2}{dy}\right)_{y=y_0} = 0$, then there is a value $y_1 > y_0$ for which $u_2(y)$ possesses a pole of second order; 2) if for $0 < y < y_0$ the function possesses no singularities, then it has a logarithmic singularity in $y = 0$; 3) By similarity transformation the consideration can be restricted to the interval $0 \leq y \leq 1$; 4) in the point zero it is either

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Priklad.Mat.Mech. 20, 613-620 (1956) CARD 3/4 PG - 585

$u_2 = \frac{4}{y^2}$ or $u_2 = a_o + \frac{1}{4} a_o^2 y^2 + \frac{1}{32} a_o^3 y^4 + \frac{1}{288} a_o^4 y^6 + \ldots$; 5) the point $y = 1$ is either not singular and the solution of (3) depends on two parameters $u_2(1)$, $u_2'(1)$ or

$$u_2 = (y-1)^{-2} \left\{ 6 - \frac{6}{5}(y-1) + \frac{49}{50}(y-1)^2 - \frac{113}{125}(y-1)^3 + \frac{4583}{5000}(y-1)^4 - \right.$$

$$\left. - \frac{81139}{45000}(y-1)^5 + \delta \frac{6272}{3125}(y-1)^6 \ln|y-1| + C(y-1)^6 + \ldots \right\} .$$

C - arbitrary, $\delta = +1$ for $y < 1$ and $\delta = -1$ for $y > 1$. By aid of these results the author discusses the possible flows. By different combinations of exact and approximative solutions different flows are obtained, e.g. for plane flows it is obtained

$$u = \left(\frac{x}{y}\right)^2 , \quad v = -\frac{2}{3}\left(\frac{x}{y}\right)^3,$$

for axialsymmetric flows

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

Priklad.Mat.Mech. 20, 613-620 (1956) CARD 4/4 PG - 585

$$u = \frac{2}{3}\left(\frac{x}{y}\right)^2, \quad v = -\frac{4}{9}\left(\frac{x}{y}\right)^3$$

or for plane flows

$$u = \frac{x^2}{6}\left[\alpha_2 + \sqrt{3}\,|\alpha_2|\left\{\operatorname{tg}\frac{1}{2}\operatorname{am}\left(\frac{\sqrt{2|\alpha_2|}}{\sqrt[4]{3}}\,y\,;\,k\right)\right\}^2\right], \quad v = \frac{x^3}{18}\frac{du_2}{dy},$$

where $k^2 = \frac{1}{2}\left(1 - \frac{\sqrt{3}}{2}\operatorname{sign}\alpha_2\right)$ and am is the reversal of the alliptic integrals of first class in trigonometric form.

INSTITUTION: Moscow.

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

AUTHOR: Zhigulev, V.N. (Moscow) SOV/40-22-3-13/21

TITLE: ~~On a~~ Class of Motions in Magneto-Hydromechanics (Ob odnom klasse dvizheniy v magnitnoy gidromekhanike)

PERIODICAL: Prikladnaya matematika i mekhanika, 1958, Vol 22, Nr 3, pp 389 - 390 (USSR)

ABSTRACT: The author investigates solutions of the basic equation of magneto-hydromechanics, whereby the medium is assumed to be ideal. Thus losses by Joulean heat are neglected and the influences of viscosity and thermal conductivity are not taken into account. The system of the basic equations is completed by an equation of state for the medium of the general form :

$$p = f(\varrho, s)$$

That class of motions is now investigated which satisfy the conditions :

$$(\overline{H}\nabla)\overline{H} = 0 \quad ; \quad (\overline{H}\nabla)\overline{v} = 0 \, .$$

Here $\overline{H}$ is the vector of the field intensity of the magnetic field and $\overline{v}$ is the vector of velocity of the gas particles. The last two conditions physically mean the constancy of the

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vectors $\overline{H}$ and $\overline{V}$ along the lines of force of the magnetic field. For plane flows and flows symmetrical about an axis for which the vectors of velocity and of the field intensity are normal to each other the equations can be simplified so that direct analogies to well-known theorems of fluid dynamics can be calculated. A theorem concerning the conservation of the circulation is derived which is completely analogous to the well-known theorem of Thomson.
Applying the method of the author most of the methods of ordinary hydromechanics can be used for the solution of flows of magneto-hydromechanics without essentially greater work of calculation. Finally the author directs to the fact that even such media can be considered for which a certain thermal conductivity and viscosity exists, if only the given conditions for the field intensity and velocity are satisfied. There are 2 Soviet references.

SUBMITTED: February 7, 1958

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

Voprosy Magnitnoy Gidrodinamiki i Dinamiki Plazmy. Trudy Konferentsii Po Magnitnoy Gidrodinamike, Riga, 2-10 Iyulya 1958 g. (Problems of Magnetohydrodynamics and Plasma Dynamics. Works of the Conference On Magnetohydrodynamics, Riga, 2-10 July 1958), 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 49-58

"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 67-72 (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. K. Khalev, Moscow, pp 93-105

"Observation of Electrodynamic Contraction of an Arc With the Aid of an Electron-Optical Converter," by Z. L. Granovskiy, K. P. Kuzmina, 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. Zhigulev, Moscow, pp 185-190

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PHASE I BOOK EXPLOITATION SOV/3762

Konferentsiya po magnitnoy gidrodinamike. Riga, 1958.

Voprosy magnitnoy gidrodinamiki i dinamiki plazmy; trudy Konferentsii. (Problems in Magnetohydrodynamics and Plasma Dynamics; Transactions of a Conference) Riga, Izd-vo AN Latviyskoy SSR, 1959. 343 p. Errata slip inserted. 1,000 copies printed.

Sponsoring Agency: Akademiya nauk Latviyskoy SSR. Institut fiziki.

Editorial Board: D.A. Frank-Kamenetskiy, Doctor of Physics and Mathematics, Professor; A.I. Vol'dek, Doctor of Technical Sciences, Professor; I.M. Kirko, Doctor of Physics and Mathematics; V.Ya. Veldre, Candidate of Physics and Mathematics; V.G. Vitol, Candidate of Physics and Mathematics; Yu.M. Krumin'; and V.Ya. Kravchenko.

Ed.: A. Teytel'baum; Tech. Ed.: A. Klyuzinya

PURPOSE: This book is intended for physicists working in the field of magnetohydrodynamics and plasma dynamics.

COVERAGE: This volume contains the transactions of a conference held in Riga, June 1958, on problems in applied and theoretical magnetohydrodynamics. The objects of the conference were the investigation of the basic trends in theoretical and applied magnetohydrodynamics, establishing contact between the people doing research in different branches of magnetohydrodynamics, and promoting the participation of theoretical physicists in problems in applied magnetohydrodynamics. More than 160 persons from different parts of the Soviet Union took part in the conference, and 33 papers were read. Similar conferences are to be held regularly in the future; the next such conference is scheduled to be held in Riga in June 1960. In this present collection of the transactions of the conference, most of the papers and comments on papers are presented by the authors themselves in an abridged form. The book is divided into two parts: the first part deals with problems in theoretical magnetohydrodynamics and plasma dynamics, and consists of 33 articles on such aspects of the problem as the application of magnetohydrodynamics in astrophysics (D.A. Frank-Kamenetskiy), magnetohydrodynamics and the investigation of cosmic-ray variations (L.I. Dorman), acceleration of plasma in a magnetic field (S.V. Gordeyev and S.I. Gubanov), stability of shock waves and magnetohydrodynamics (A.I. Akhiyezer). The second part, consisting of 33 articles, deals with problems of experimental magnetohydrodynamics, including the application of physical simulation for investigation of electromagnetic processes in liquid metals (I.M. Kirko) and the development of electromagnetic pumps (P.G. Kirillov), at the Institute of Physics of the Academy of Sciences, Latvian SSR. Several articles are devoted to induction pumps, electromagnetic crucibles, electromagnetic stirrers for molten metals, and their application in the metallurgical industry including schematic diagrams of their power-supply systems. References are given at the end of most of the articles.

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Kirko, I.M. Comments on the Paper 211

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ZHIGULEV, V.N. (Moskva)

Analysis of weak disturbances in magnetic hydromechanics. Prikl. mat. i mekh. 23 no.1:81-85 Ja-F '59. (MIRA 12:2)
(Magnetohydrodynamics)

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24(3)

AUTHOR: Zhigulev, V. N. SOV/20-124-5-11/62

TITLE: The Theory of the Magnetic Boundary Layer (Teoriya magnitnogo pogranichnogo sloya)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 5, pp 1001-1004 (USSR)

ABSTRACT: The present paper gives examples for the illustration of the fact that a moving plasma is screened by the external magnetic field and by the currents flowing therein. The thickness of the screened-off layer (which is called magnetic boundary layer) in the case of motions with high magnetic Reynolds-numbers has the order of magnitude $1/\sqrt{Re_m}$. First, the (rather voluminous) magnetohydrodynamic equations of this problem are written down and the quantities used therein are defined. A semi-infinite plate is assumed to exist which is located in the half plane xz, $x > 0$. Along this plate an electric current flows in the direction Oz, and the plate is assumed to be submerged in a resting conductive fluid, the current in the plate being insulated against the liquid. In the liquid a magnetic field with the

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The Theory of the Magnetic Boundary Layer

field strength $\vec{H}$ is then induced parallel to the xy-plane. If the liquid moves at the rate $\vec{U}$ in the Ox-direction, the magnetic field vanishes in the main current and is conserved only in that layer which is adjacent to the surface of the plate and has a thickness of the order of $L/\sqrt{Re_m}$. This layer is described as magnetic boundary layer of the first kind. Next, another magnetic boundary layer of the second kind is defined. By means of estimations similar to those in the case of an ordinary boundary layer, equations are obtained for the magnetic boundary layers of the first and second kinds; they are here explicitly written down. The pressure which is vertical to the magnetic boundary layers varies by many times, by which fact the magnetic boundary layers are distinguished considerably from the ordinary boundary layers. This is a consequence of the remote action of the electromagnetic forces and may be used for the thermal insulation of bodies. The result of an application of similarity to solutions for the equations of the magnetic boundary layer of the first and second kind for an incompressible liquid is written down. In the case of the magnetic boundary layer of the first kind the magnetic field is equal to zero, but in the case of the magnetic

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boundary layer of the second kind it is the main factor. According to the examples investigated, a moving plasma shows the tendency to screen itself off against the external magnetic field and the magnetic currents flowing therein. This is an analogue to the known effect of the screening of a plasma at rest against an external electric field. There are 2 figures and 4 Soviet references.

ASSOCIATION: Tsentral'nyy aero-gidrodinamicheskiy institut im. N. Ye. Zhukovskogo (Central Aero-hydrodynamical Institute imeni N. Ye. Zhukovskiy)

PRESENTED: October 14, 1958, by L. I. Sedov, Academician

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24(3)

AUTHOR: Zhigulev, V. N. SOV/20-124-6-12/55

TITLE: The Theory of Electric Discharge in a Moving Conducting Medium (Teoriya elektricheskogo razryada v dvizhushcheysya provodyashchey srede)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 6, pp 1226 - 1228 (USSR)

ABSTRACT: The present paper discusses a new phenomenon, viz. the contraction of an electric discharge in a moving conducting medium. This phenomenon may also be used for the production of high temperatures. A certain motion of a conductive medium is assumed to exist. The electrodynamic part of the equations of magnetic hydrodynamic has the form $\frac{\partial \vec{H}}{\partial t} + (\vec{V}\nabla)\vec{H} = (\vec{H}\nabla)\vec{V} - \vec{H}\,\mathrm{div}\vec{V} + \nu_m \Delta\vec{H}$. Here $\vec{H}$ denotes the vector of magnetic field strength, $\vec{V}$ the vector of the velocity of the medium, ν_m magnetic viscosity. The author then applies the operation curl to the above mentioned equation, and the equations resulting therefrom are explicitly written down.

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The Theory of Electric Discharge in a Moving Conducting Medium SOV/20-124-6-12/55

The streamlines are described in this paper as lines of the field vector $\vec{j}$. The author further investigates motions which satisfy the conditions div $\vec{V} = 0$, $(\vec{H}\nabla)\vec{V} = 0$; $\nabla(\vec{V}\vec{H}) = 0$. In this special case in consideration of

$$\vec{j} = (c/4\pi)\,\mathrm{curl}\,\vec{H},\ \frac{\partial\vec{j}}{\partial t} + (\vec{V}\nabla)\vec{j} - (\vec{j}\nabla)\vec{V} = 0$$ results. From this equation and from A. A. Fridman's theorem on the conservation of the streamlines the following conclusion may be drawn: In the case of the above-mentioned conditions concerning the motion of a medium with infinite conductivity the streamlines have the property of conservativity. This class of motions comprises, among others, the following kinds of motion: 1) Plane motions, where the vector $\vec{H}$ is vertical to the plane of motion. 2) Certain axially-symmetric lines of force, which are circles having their centers on the symmetry axis and are in planes that are vertical to the symmetry axis. In the second part of the present paper an electric circle is investigated which consists of a linear electrode in form of a semicylinder and an electromotive force. If this current circuit is immerged in a conductive liquid which is at rest

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and closed, an electric current is generated in the liquid, which is distributed nearly uniformly on an angle of the magnitude π. The liquid is then moved at the constant rate of $\vec{U}$. An electric current is then generated in form of a thin jet, the thickness of which is of the order of magnitude $L/\sqrt{Re_m}$. This jet is in the plane case a magnetic boundary layer of the second kind. The equations of magnetic hydrodynamics corresponding to this case are also written down. In the plane case the solution for H belongs to the class of self-modeling solutions. The expression corresponding to this case for the current density vector is explicitly written down. Next, a solution for H is written down for the axially-symmetric case: $H = x^{-1/2}h(\xi)$; $\xi = y/\sqrt{\nu_m x/U}$. In addition, there is an equation for $h(\xi)$. In conclusion, an expression is derived for temperature distribution in the case of a plane discharge. There are 2 figures and 3 Soviet references.

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The Theory of Electric Discharge in a Moving Conducting Medium SOV/20-124-6-12/55

ASSOCIATION: Tsentral'nyy aerogidrodinamicheskiy institut im. N.Ye. Zhukovskogo (Central Aero-hydrodynamic Institute imeni N.Ye. Zhukovskiy)

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10 (7)

AUTHOR: Zhigulev, V. N. SOV/20-126-3-17/69

TITLE: On the Phenomenon of the Magnetic "Displacement" of the Flow of a Conductive Medium (O yavlenii magnitnogo "otzhatiya" potoka provodyashchey sredy)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 3, pp 521-523 (USSR)

ABSTRACT: In the present paper the flow round a body, which has a magnetic field of its own, by a flow of conductive gas is investigated. In the introduction, reference is made to a paper by A. G. Kulikovskiy (Ref 1), upon which this work is based. The first part deals with flows of conductive gases with a high magnetic Reynold's number. In this case a magnetic boundary layer is formed, for the thickness of which a formula is given. This formula (1) gives the distribution of pressure and of the magnetic voltage in this layer. Proceeding from this condition, the displacement of the flowing gas is then investigated. In the second part of the paper, the flow of a gas round a system of parallel linear electric currents is dealt with on the basis of the general pressure distribution on the surface; by means of a corresponding image, the

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On the Phenomenon of the Magnetic "Displacement" of the Flow of a Conductive Medium SOV/20-126-3-17/69

analytical function for the magnetic field in this surface is developed. Finally, a single electric current line in the conductive medium with high Mach number is investigated. Equation (4) gives the pressure distribution, and in the following, the conditions for the equilibrium of gas-dynamic and magnetic pressure are investigated. In conclusion it is said that the example investigated shows the possibility of a complete insulation of a body from a plasma flowing round it. There are 2 figures and 3 Soviet references.

ASSOCIATION: Tsentral'nyy aero-gidrodinamicheskiy institut im. N. Ye. Zhukovskogo (Central Aero-hydrodynamical Institute imeni N. Ye. Zhukovskiy)

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SOV/20-127-5-18/58

3(6)

AUTHORS: Zhigulev, V. N., Romishevskiy, Ye. A.

TITLE: On the Interaction of the Flows of a Conductive Medium With the Magnetic Field of the Earth

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 5, pp 1001-1004 (USSR)

ABSTRACT: The motion of the earth passing through an ionized interplanetary gas is investigated, as well as the interaction between the corpuscular flux of the sun and the magnetic field of the earth. Reference is made to papers by other authors dealing with this problem (Refs 2,3). From reference 4 it is mentioned that the interplanetary substance is an ionized electrically neutral gas (mixture of protons and electrons) with an average density of $10^2 - 10^4$ particles in 1 cm^3 and a temperature of up to 10^4 °K, which is either at rest or attains velocities of up to 10^9 cm/sec. In the latter case corpuscular fluxes of the sun are concerned. It is concluded from reference 5 that the investigated interaction manifests itself by the fact that the flow of the ionized gas flows round a cavity (Fig 1), which includes the magnetic

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On the Interaction of the Flows of a Conductive Medium With the Magnetic Field of the Earth

field of the earth. Outside this cavity there is no magnetic field, and on the boundary of the cavity magnetic pressure is assumed to be in equilibrium with gas-dynamic pressure; the normal component of the magnetic field is equal to zero. The cavity is symmetric to a plane passing through the magnetic axis of the earth and directionad parallel to the terrestrial orbit. The electric fluxes on the boundary of the cavity flow in planes parallel to the equator in a western direction. The magnetic field has critical points, i.e. points near the place at which the magnetic axis of the earth pierces the boundaries of the cavity. The magnetic lines of force flow into these points and carry particles of the ionized medium into the interior of the cavity with them. This process explains the phenomenon of polar lights. Following the method of reference 5, the interaction investigated is carried out as a plane problem (Fig 2). For a plane magnetic dipole of given intensity and inclination to the x-axis the magnetic field and the cavity are calculated. The deduced formulas (7) and (8) are analogues of the formulas by Chaplygin and Blasius for the hydrodynamics of incompressible fluids. This is probably also of importance

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On the Interaction of the Flows of a Conductive Medium With the Magnetic Field of the Earth

SOV/20-127-5-18/58

for the aerodynamics of the plasma, because it shows that it is possible, by means of a magnetic dipole, to produce long-range forces, which act upon a medium in motion. There are 2 figures, 1 table, and 7 references, 6 of which are Soviet.

ASSOCIATION: Tsentral'nyy aerogidrodinamicheskiy institut im. N. Ye. Zhukovskogo (Central Institute of Aero- and Hydrodynamics imeni N. Ye. Zhukovskiy)

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ZHIGULEV, V. N. (Moscow)

"On the Existence of Solutions in Magnetohydrostatics and on the Axisymmetric Discharge."

report presented at the First All-Union Congress on Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb 1960.

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ZHIGULEV, V.N. (Moskva)

Magnetic boundary layer in a compressed fluid. Izv.AN SSSR. Otd. tekh.nauk.Mekh.i mashinostr. no.5:9-13 S-O '60. (MIRA 13:9)
(Boundary layer) (Magnetic fields)

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AUTHOR: Zhigulev, V.N. SOV/20-130-2-10/69

TITLE: On the Phenomenon of Ejection Due to an Electric Discharge

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 130, Nr 2, pp 280-283 (USSR)

ABSTRACT: The author studied the theory of electric discharge in a finite-conducting medium. It is shown that in general an axially symmetric discharge is accompanied by a motion of the medium on which it has an ejecting effect. For a plane discharge in an incompressible medium the equations of magnetohydrodynamics read as follows: $(\vec{v}\nabla)H = \nu_m \Delta H$, $\operatorname{div} \vec{v} = 0$, $(\vec{v}\nabla)\vec{v} = -\frac{1}{\varrho}\nabla p_m$. H denotes the magnetic field strength, ν_m the magnetic viscosity, ϱ the density of the medium, p the pressure, $\vec{v}$ the velocity vector. Furthermore, $p_m = p + H^2/8\pi$ holds. If the medium did not move before the discharge, there exists no motion in many cases of steady discharge. Then, it holds: $\Delta H = 0$ and $p + H^2/8\pi = \text{const}$. Next, the author

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On the Phenomenon of Ejection Due to an Electric Discharge

SOV/20-130-2-10/69

presents equations for the case of steady axially symmetric discharge in an incompressible medium. It is shown that an axially symmetric discharge is impossible in a medium at rest. The axially symmetric discharge investigated in the present paper is always accompanied by a motion of the medium. Following this the author studies the case in which the dimensionless expression $R = I/\nu_m c \sqrt{\varrho}$ is large, i.e., $R \gg 1$. Here, c denotes the velocity of light and I the total amperage in the discharge. R is the ratio between the characteristic amount of the inertia terms and the characteristic amount of the dissipative term in an equation of the above-mentioned system. With a large R, a phenomenon of the boundary-layer type occurs, i.e., the discharge concentrates near the x-axis. A divergent discharge has an ejecting effect upon the medium. The proof given holds also for compressible media of variable conductivity. Next, a similarity transformation of the type $\varphi_1 = \mu_\varphi \varphi_2$ is carried out in the transformed system of magnetohydrodynamic equations. μ_φ is a dimensionless constant quantity,

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On the Phenomenon of Ejection Due to an Electric Discharge

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and φ means all variables and constants contained in the above set of equations. Then, two discharges in two different media are studied, in which $\omega = \nu/\nu_m$ and the magnetic Prandtl number are equal. The author further investigates discharges between two point electrodes located on the x-axis. Then, the only boundary condition reads as follows: $\lim_{y\to\infty} yH = 2I/c$ holds within the range $0 < x < x_B$, where I denotes the total amperage in the discharge. Next, the author derives a similarity condition for two discharges in media with equal ω and Pr_m between a point electrode A and an infinitely thin ring with a radius B for an equal distance between point A and the ring and for different radii of the rings. The system of equations for an axially symmetric discharge leads to self-simulating solutions. With a large spacing between the electrodes A and B, the behavior of the discharge in the neighborhood of electrode A is described by a self-simulating solution. In conclusion, the author

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On the Phenomenon of Ejection Due to an Electric Discharge

SOV/20-130-2-10/69

points out that there exists a self-simulating solution for a compressible, viscous, perfect gas with arbitrary R, constant viscosity, heat conductivity, and magnetic viscosity. There are 3 figures.

ASSOCIATION: Tsentral'nyy aerodinamicheskiy institut im. N.Ye.Zhukovskogo (Central Institute of Aerodynamics imeni N.Ye.Zhukovskiy)

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AUTHOR: Zhigulev, V. N.

TITLE: Theory of the "Returning" Layer

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 6, pp. 1313 - 1316

TEXT: First, some results of a previous paper (Ref. 1) of the author are discussed, in which the interaction of a plasma current with an external magnetic field was studied. In the present paper, a theory of the relativistic "returning" layer is studied for the case where the direction of plasma motion is perpendicular to the layer. The equations of motion are determined for electrons and ions, and solutions are derived. Strictly speaking, an infinite thickness of the "returning" layer is obtained from the solutions for $m_e = m_i = m$ (the electron mass is equal to the ion mass). Due to the exponential decrease, the actual density of the "returning" layer is small. For $m_e/m_i \ll 1$, the "returning" layer is characterized as follows: 1) The current in the "returning" layer consists only of

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Theory of the "Returning" Layer

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electrons. 2) The electric field constitutes the main component of the force acting upon the ions in the direction of the normal to the layer. 3) The forces acting upon one electron allow the inertia of the electrons to be ignored. 4) From $\omega = (u_0/c)^2 m_i/m_e = 1$ it follows that the electrons in the "returning" layer attain almost light velocity, i.e., the electrons are accelerated in the "returning" layer. In conclusion, the "returning" layer of the earth is studied. Since $\omega = 2.07 \cdot 10^{-2}$ and is thus very small, the author proceeds from simplified equations and obtains $2.6 \cdot 10^4$ cm for the thickness of the "returning" layer. Two expressions are given for the Larmor radii of electrons and ions, from which it may be seen that they differ by orders of magnitude from the thickness of the "returning" layer. The maximum electron velocity is $4.3 \cdot 10^9$ cm/sec, which corresponds to 5.23 kev. There are 2 figures and 2 references: 1 Soviet and 1 British.

ASSOCIATION: Tsentral'nyy aero-gidrodinamicheskiy institut im. N. Ye. Zhukovskogo (Central Aerodynamical Institute imeni N. Ye. Zhukovskiy)

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Theory of the "Returning" Layer

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B019/B056

AUTHOR: Zhigulev, V. N.

TITLE: The Effect of Magnetic Compression in a Plasma Current of Free Molecules. (The Theory of the Flow of Solar Corpuscular Streams Round the Magnetic Dipole of the Earth)

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 6, pp. 1364 - 1366

TEXT: The flow of a plasma current of free molecules round a body is investigated, it being assumed that the body has a magnetic field of its own, that the interaction parameter is large compared to the thickness of the "returning" layer, and is greater than any dimension of the body. The problem of magnetic compression is formulated, and the results obtained by the investigation are applied to the flow of a solar plasma current of free molecules round the Earth. Due to the interaction between the plasma current and the magnetic field, a cavity is formed which is bounded by the "returning" layer. The position of the "returning" layer is studied for completely and partly ionized plasma currents. When

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The Effect of Magnetic Compression in a Plasma Current of Free Molecules (The Theory of the Flow of Solar Corpuscular Streams Round the Magnetic Dipole of the Earth)

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B019/B056

applying the results obtained to the terrestrial magnetic field, one finds that at those points of the "returning" layers where the magnetic axis passes through this layer, there exist critical points where the magnetic field vanishes. The behavior of particles near these critical points requires a special investigation. There are 2 figures and 3 references: 2 Soviet and 1 British.

ASSOCIATION: Tsentral'nyy aerogidrodinamicheskiy institut im. N. Ye. Zhukovskogo (Central Aerohydrodynamic Institute imeni N. Ye. Zhukovskiy)

PRESENTED: August 9, 1960, by L. I. Sedov, Academician

SUBMITTED: June 17, 1960

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ZHIGULEV, V.N. (Moskva)

Motion equations for a nonequilibrium medium taking radiation into consideration. Inzh. zhur. 4 no.2:231-241 '64 (MIRA 17:8)

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ACCESSION NR: AP4043516 S/0258/64/004/003/0431/0438

AUTHOR: Zhigulev, V. N. (Moscow)

TITLE: On the equations of motion for nonequilibrium media, taking radiation into account

SOURCE: Inzhenernyy zhurnal, v. 4, no. 3, 1964, 431-438

TOPIC TAGS: nonequilibrium media, motion equation, distribution function, boundary layer, Maxwell equation, Navier Stokes equation, Knudsen number

ABSTRACT: The author used the equations derived by V. N. Zhigulev (Uravneniya dvizheniya neravnovesnoy sredy* s uchetom izlucheniya. Inzh. zh., t. IV, vy*p. 2, 1964, and Ob uravneniyakh fizicheskoy aerodinamiki. Inzh. zh., t. III, vy*p. 1, 1963) to analyze the second approximation of the distribution function for nonequilibrium systems and to obtain a set of hydrodynamic equations and the corresponding boundary layer equations. The equations obtained in the above references are

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ACCESSION NR: AP4043516 $J(\varphi) = D$, $J(\varphi) \equiv \sum \int f^{(0)} f_1^{(0)} (\varphi' + \varphi_1' - \varphi - \varphi_1)\, dP$,

$$D \equiv f^{(0)} \left\{ \frac{m}{kT} \mathbf{C}\mathbf{C} : \frac{\partial \mathbf{V}}{\partial \mathbf{r}} + \left(\frac{mC^2}{2kT} - \frac{5}{2} \right) \mathbf{C} \frac{\partial \ln T}{\partial \mathbf{r}} + \frac{E_N - E_1}{kT_1} \mathbf{C} \frac{\partial \ln T}{\partial \mathbf{r}} + \right.$$

$$+ \left(\frac{mC^2}{3k^2T^2} - \frac{1}{kT} - \frac{E_N - E_1}{kT_1^2 E_1'} \frac{\Omega}{n} - \frac{E_N - E_1}{kT_1^2 n E_1'} \Phi - (\Sigma' + \Delta f \mathrm{Rad}_{f = f^{(0)}} \right.,$$

$$f = f^{(0)} (1 + \varphi)$$

the various quantities of which are explained in the above references. It was shown that these equations could be separated into a set of 5 independent equations of the form $J(\varphi_\omega) = D_\omega$ $(\omega = 1, 2, 3, 4, 5)$.

The solution for the perturbation on the distribution function can be expressed as

$$\varphi = \frac{1}{n} A_1 (CE_N TT_1) \mathbf{C} \frac{\partial T}{\partial \mathbf{r}} + \frac{1}{n} A_2 (CE_N TT_1) \mathbf{C} \frac{\partial T_1}{\partial \mathbf{r}} +$$

$$+ \frac{1}{n} B (CE_N TT_1) \mathbf{C}\mathbf{C} : \frac{\partial \mathbf{V}}{\partial \mathbf{r}} + A_3 (CE_N TT_1) + \frac{1}{n} A_4 (CE_N TT_1).$$

By taking moments of the distribution function, the various hydrodynamic quantities were obtained and a set of Navier-Stokes type equations was derived. The distribution function was expanded around a Maxwellian in half powers of the Knudsen number, and the following set of boundary layer equations were derived:

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(a) $$\frac{\partial n}{\partial t} + \frac{\partial nu}{\partial x} + \frac{\partial nv}{\partial y} = 0,$$

(b) $$\rho \frac{du}{dt} = -\frac{\partial p}{\partial x} + \frac{\partial}{\partial y}\left(\mu \frac{\partial u}{\partial y}\right), \quad p = nkT,$$

(c) $$\frac{\partial p}{\partial y} = 0,$$

(d) $$n \frac{d}{dt}\left(\frac{3}{2}kT + E_i\right) + p\left(\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y}\right) - 2\mu\left(\frac{\partial u}{\partial y}\right)^2 - $$
$$- \frac{\partial}{\partial y}\left[(\lambda_i + \lambda_{ii})\frac{\partial T}{\partial y} + (\lambda_i + \lambda_{ii})\frac{\partial T_i}{\partial y}\right] + \Phi = 0,$$

(e) $$n \frac{dE_i}{dt} - \frac{\partial}{\partial y}\left(\lambda_i \frac{\partial T_i}{\partial y} + \lambda_{ii}\frac{\partial T}{\partial y}\right) - n^2 F(TT_i) + \Phi = 0,$$

(f) $$n \frac{\partial J_\nu}{\partial r} = \Phi_\nu.$$

$$\Phi_\nu = k_\nu'(B_\nu - J_\nu), \quad \Phi = \sum_\nu \int_h \Phi_\nu \, dn,$$

$$B_\nu = \frac{h\nu^3}{4\pi^3 c^2} \frac{1}{e^{h\nu/kT_i} - 1}, \quad k_\nu' = \sum_{h\nu = \text{const}} h\nu n_{\bar{N}} b_{\bar{N}}^{N} (1 - e^{-h\nu/kT_i}).$$

The author thanks M. M. Leontovich, S. I. Braginskiy and B. B. Kadomtsev for the helpful discussion of the several results obtained in this work. Orig. art. has: 30 equations.

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"APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064810005-5

ACC NR: AP5027218 SOURCE CODE: [illegible]

AUTHOR: Yegorov, B. V.; Zhiguley, V. N.; Kuznetsov, V. M.

ORG: Central Institute of Aerohydrodynamics im. N. Ye. Zhukovskiy (Tsentral'nyy aerogidrodinamicheskiy institut)

TITLE: On equations of aerodynamics in the presence of binary molecular processes

SOURCE: AN SSSR. Doklady, v. 164, no. 6, 1965, 1249-1252

TOPIC TAGS: aerodynamics, gas kinetic equation, degree of freedom, gas relaxation, vibration relaxation, heat transfer, heat diffusion, thermal diffusion, gas viscosity

ABSTRACT: Processes taking place in gas flows with excited internal degrees of freedom are considered. The various methods and results obtained by different authors for solving hydrodynamic equations on the basis of the kinetic theory of gases are analyzed and discussed. A specific case called "two-temperature" relaxation is considered when $l_t \sim l_i \ll l_{ti} \sim L$, where l_t and l_i are the lengths required to establish equilibrium in translational and internal degrees of freedom, respectively, l_{ti} is the length of relaxation region, and L is the characteristic dimension of a body. Expressions for the dissipative coefficients (viscosity, diffusion, and thermal diffusion) are derived, and the influence of the resonance transitions on heat conductivity is evaluated. The results obtained for O_2, N_2, Cl_2, and I_2 show the strong influence of nonequilibrium on the magnitude of the heat flux. Orig. art. has: 2 figures. [AB]

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