Macrophotography by Means of a Biological Microscope 26-10-19/44

ASSOCIATION: Kuban' Medical Institute (Krasnodar) (Kubanskiy meditsinskiy institut (Krasnodar)

AVAILABLE: Library of Congress

Card 2/2

RUKAVTSOV B. I.

EXCERPTA MEDICA Sec 4 Vol 12/1 Med. Micro. Jan 59

2. CYTOLOGICAL OBSERVATIONS OF A CULTURE OF BACTERIUM COLI, CARRIED OUT WITH THE AID OF AN ANOPTRAL MICROSCOPE (Russian text) - Rukavtsov B. I. - DOKLADY AKAD. NAUK SSSR 1957, 115/6 (1200-1201) Illus. 4

A report is given on anoptral microscopy of Wilska and Peshkov of living unfixed cells of E. coli. Nucleoids could be observed, the nature of which was ascertained by comparison with stained preparations. Kunicki-Goldfinger - Wroclaw

RUKAVTSOV, B.I.

Studies on the nuclei of gram-negative bacteria with the aid of an anoptral microscope. Zhur.mikrobiol.epid. i immun. 29 no.5:3-7 My '58 (MIRA 11:6)

1. Iz kafedry mikrobiologii Kubanskogo meditsinskogo instituta
(BACTERIA,
gram-negative, anoptral microscopy of nuclei (Rus))
(MICROSCOPY,
anoptral, of nuclei of gram-negative bact. (Rus))

RUKAVTSOV, B.I.; SHUBICH, M.G.

Optical coloration in laboratory diagnosis. Lab.delo 3 no.5:54-56 S-O '57. (MIRA 11:2)

1. Iz kafedr mikrobiologii (zav. - prof. B.P.Pervushin) i gistologii (zav. - dotsent G.F.Berezentseva) Kubanskogo meditsinskogo instituta.
(MICROSCOPY)

RUKAVTSOV, B.I.; TSYNKALOVSKIY, I.B.(Krasnodar)

Photography fo the intestinal mucosa through a proctoscope. Klin. med. 35 no.11:134-135 N '57. (MIRA 11:2)

1. Iz kafedry mikrobiologii (zav. - prof. B.P.Pervushin) i kafedry infektsionnykh bolezney (zav. - prof. G.S.Dem'yanov) Kubanskogo meditsinskogo instituta (dir. - prof. V.K.Suprunov)

(PHOTOGRAPHY,
rectoscopic, pathol. in pathol. study of intestinal mucosa)
(PROCTOSCOPY
photography, in pathol. study of intestinal mucosa)

RUKAVTSOV, B.I.

Photographing comparatively large objects by using the biological microscope. Priroda 46 no.10:99 O '57. (MIRA 10:10)

1. Kubanskiy meditsinskiy institut, Krasnodar.
(PHOTOMICROGRAPHY)

RUKAVTSOV, B.I.

Cytological observations of a culture of Bacterium coli carried out with the aid of an anoptral microscope. Dokl. AN SSSR 115 no.6:1200-1201 Ag '57. (MIRA 11:1)

1. Kubanskiy meditsinskiy institut. Predstavleno akademikom V.N. Shaposhnikovym.

(ESCHERICHIA COLI)

RUKAVTSOV, B. I.

USSR/Medicine - Dysentery FD-549

Card 1/1 Pub. 148 - 12/23

Author : Rukavtsov, B. I.

Title : Concerning the characteristics of atypical dysentery cultures

Periodical : Zhur. mikrobiol. epid. i immun. 6, 32, Jun 54

Abstract : Atypical dysentery cultures isolated from 18 adults and 76 nursery-age children were investigated bacteriologically in an attempt to discover common biochemical characteristics among the various strains of bacilli present in the cultures. Eighty-two of the strains were of the Flexner group; 11, of the Stutaer-Schmitz group; and one, of the Griogor'yev - Shiga group. Biochemical changes were observed in more than half the cultures. There were no essential differences in the biochemistry, agglutinability, or phagolyzability of certain of the cultures even after 6 months. No references are cited.

Institution : The Chair of Microbiology (Head - Prof. B. P. Pervushin) of the Kuban' Medical Institute (Director - Prof. F.Kh. Chekhlatyy)

Submitted : March 8, 1954

RUKAVTSOV, B.I.; SHUBICH, M.G.

Cytochemical investigation of polysaccharides in the typhoid-paratyphoid group of bacteria. Zhur. mikrobiol., epid. i immun. 27 no.8: 72-76 Ag '56. (MLRA 9:10)

1. Iz kafedry mikrobiologii i gistologii Kubanskogo meditsinskogo instituta.

(SALMONELLA PARATYPHI, metabolism, polysaccharides, determ. (Rus))
(SALMONELLA TYPHOSA, metabolism, same)
(POLYSACCHARIDES, metabolism, Salmonella paratyphis & typhosa, determ. (Rus))

RUKAVTSOV, B. I.

AUTHOR: Rukavtsov, B. I. 20-6-40/48

TITLE: Cytological Observations of Cultures of Escherichia coli Carried out with the Aid of an Anoptral Microscope (Tsitologicheskiye nablyudeniya nad kul'turoy kishechnoy palochki v anoptral'nom mikroskope).

PERIODICAL: Doklady AN SSSR, Vol. 115, Nr 6, pp. 1200-1201 (USSR)

ABSTRACT: After a survey of the methods hitherto employed in investigating the living bacterium-cell (phase-contrast-microscope) the author emphasizes the high qualities of the anoptral microscope used for this purpose. Pictures of the impressions are described which remain on the object-glass carrier after the application of culture-medium agar from 30 minutes to 48 hours old cultures. The differences between the individual ages are fully described and illustrated by micro-photographs (figures 1-4). A characteristic picture is observed in 1,5 hours old cultures. From it one gains the impression of an active partition of intracellular inclusions. According to its modifications of form, the 18 hours old culture hardly differed from the initial culture. The problem of the nature of the observed modifications of

CARD 1/2

form can, it is true, not alone be solved by the microscopic method employed here. Identical results were obtained by checking with the aid of dyeing. This indicates the same character of the structure to be seen in undyed preparations under the anoptral microscope and those manifesting themselves by dyeing. Thus the above-mentioned microscope permits a vivo-investigation of the nuclear apparatus of bacteria in undyed preparations and is therefore a very valuable device. There are 3 photographs, 6 Slavic references.

ASSOCIATION: Kuban' Medical Institute (Kubanskiy meditsinskiy institut).

PRESENTED: V. N. Shaposhnikov, Academician, May 27, 1957

SUBMITTED: May 27, 1957

AVAILABLE: Library of Congress

RUKAVTSOVA, V.F.; STIFATOVA, N.N.; KOROBKIN, V.B.; MOROZOVA, T.I.; SOFRONOVA, V.A.; SHAPOROST, P.D.; PLATONOVA, N.P.; YEREMENKO, O.S.; IVANOVA, A.M.; SILAYEVA, N.Ya.; SUYETINA, S.M.; RAL'YANOVA, T.Ye.;

Study of the dust factor in the founding departments of six Krasnodar plants. Nauch. trudy Kub. gos. med. inst. 19:63-76 '62. (MIRA 17:8)

1. Iz sanitarno-epidemiologicheskoy stantsii g. Krasnodara i polikliniki No.8 Krasnodara.

RUKAVITSYN, I. N.

Geometriya svyazki sfer s radikal'nym tsentrom v beskonechnosti. L., trudy vtorogo vsesoyuzn. Matem. Shyezda, T. 2(1936), 89-93

SO: Mathematics in the USSR, 1917-1947
edited by Kurosh, A. G.,
Markushevich, A. I.,
Rashevskiy, P. K.
Moscow-Leningrad, 1948

RUKAVITSYN, I. M.

Svyaz' mezhdu stepenyami dvukh tochek otnositel'no pyati sfer ortogonal'nogo kompleksa. Irkutsk, Uchën. zap. ped. in-ta, 6 (1941), 3-6.

SO: Mathematics in the USSR, 1917-1947
edited by Kurosh, A. G.,
Markushevich, A. I.,
Rashevskiy, P. K.
Moscow-Leningrad, 1948

RUKAVITSYN, V.N., inzhener.

Irrigation of vegetable and fodder crops in Moscow Province. (MLRA 10:9)
Gidr. i mel. 9 no.9:3-11 S '57.
(Moscow Province--Irrigation)

RUKAVITSYN, V.N.

99-9-1/9

AUTHOR: Rukavitsyn, V.N., Engineer

TITLE: Irrigation Experiments with Vegetable and Fodder Crops in the Moscow District (Opyt orosheniya ovoshchnykh i kormovykh kul'tur v moskovskoy oblasti)

PERIODICAL: "Gidrotekhnika i Melioratsiya", 1957, Nr 9, pp 3-11 (USSR)

ABSTRACT: The yields of vegetable and fodder crops in the Moskva districts can be greatly increased by sprinkling, as moisture is lacking during the summer months. Irrigation by sprinkling on a larger scale was first started in 1941, when approximately 6,000 hectares of vegetables were sprinkled by using sprinkling devices "КДУ-39". After efficient sprinkling equipment was built in 1954-55 (sprinklers "ДДП-80с", floating pumping stations "СПНС-2" and the mobile tractor pumping stations "ПНС-Т2-6НДВ"), the acreage under irrigation increased constantly. The sprinklers "ДДА-100М" and "КДУ-55" designed by VNIIGiM and put into operation in 1957 were more efficient and adapted for large-scale operation. The irrigated acreage had increased from 8,100 hectares in 1955 to 12,800 hectares in 1956, and to 20,000 hectares in 1957, with the final goal for the 6th 5-years-plan being set at 40,000 hectares. The investment costs were quickly returned by considerably higher crops. Personnel

Card 1/2

Irrigation Experiments with Vegetable and Fodder Crops in the Moskva District

operating the sprinkling equipment were instructed at the Moskva Experimental Sprinkling Station by N.I. Rychkov and Ye.I. Nechayev (Moskovskaya opytnaya ispytatel'naya dozhdeval'naya stantsiya; N.I. Rychkov and Ye. I. Nechayev). The article contains 3 figures, 2 photographs and 1 table.

ASSOCIATION: VNIIGiM

AVAILABLE: Library of Congress

Card 2/2

PERLEY, Ye.M., inzh.; RUKAVTSEV, A.M., inzh.

Piles tamped by the method of vibration with widened pyriform pivots. Biul. tekh. inform. po stroi. 5 no.6:16-17 Je '59. (MIRA 12:10)

(Concrete piling)

PARLEY, Ye.M., inzh.; RUKAVTSOV, A.M., inzh.

Using tubular precast reinforced concrete piles for bridge piers. Transp.stroi. 8 no.12:14-15 D '58. (MIRA 12:1)
(Concrete piling) (Bridges--Foundations and piers)

USSR / Human and Animal Morphology, Normal and Patho- B-2
logic -- Research Methods and Techniques

Abs Jour: Ref Zhur-Biol., No 13, 1958, 59794

Author : Rukavtsov, B. I.; Tsynkalovskiy, I. B.

Inst : Not given

Title : Photographing Intestinal Mucosae Through a Proctoscope

Orig Pub: Klinich. meditsina, 1957, 35, No 11, 134-135

Abstract: A method for photographing the mucosa of the rectum and the sigmoid flexure with a "Zenith" reflex camera is described. The photographic apparatus is joined by a special sleeve (which is easily fashioned from the case of a standard light

Card 1/2

1/

RUKAWICZKA, J.

Production of vulcanized shoes. (Conclusion)

p. 244 (Odziez) Vol. 8, No. 9, Sept. 1957, Warszawa, Poland

SO: MONTHLY INDEX OF EAST EUROPEAN ACCESSIONS (EEAI) LC, VOL. 7, NO. 1, JAN. 1958

BALUDA, V.P.; LYSOGOROV, N.V.; KHNYCHEV, S.S.; ISHMUKHAMETOVA, D.N.; RUKAZENKOVA, Zh.N.; GORLANOVA, T.A.; RUDAKOV, I.A.; SUSANYAN, T.A.

Blood coagulation and its fibrinolytic activity in acute radiation sickness. Vest. AMN SSSR 20 no.9:70-74 '65. (MIRA 18:11)

1. Institut meditsinskoy radiologii AMN SSSR, Obninsk.

RUKCHEV, N.

Voyennoinzhennerno Delo /Military Engineering Manual/ G. Karakekhayov i N. Rukchev. Sofiya, "Meditsina i Fizkultura", 1957.

290 P. Illus., Diagrs., Tables.

Cover title varies: Rukovodstovo Po Voyenno- Inzhe--Nerno Delo.
USIB No. 3687833

RUKENGLAZ, S.I.

Methodology for determining the prothrombin time of blood.
Lab. delo no.10:611-612 '64. (MIRA 17:12)

1. Biokhimicheskaya laboratoriya (zaveduyushchiy S.I. Rukenglaz) Gorodskoy klinicheskoy bol'nitsy No.1 (glavnyy vrach Yu.L. Martynov), Sverdlovsk.

Rukenshteyn, E

USSR/Thermodynamics. Thermochemistry. Equilibria. Physico-Chemical Analysis. Phase Transitions. B-8

Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 26096

Author : E. Rukenshteyn
Inst : Academy of Sciences of USSR
Title : Theory of Continuous Molecular Distillation in Case of Sufficiently Short Columns.

Orig Pub : Dokl. AN SSSR, 1956, 108, No 4, 665-667

Abstract : In addition to the work published earlier (RZhKhim, 1957, 3282), the case of the continuous molecular distillation in sufficiently short columns was investigated, when the depth of the diffusion penetration (Δ) was less than the width of the layer of the liquid, in which the speed had a magnitude close to u_s (the width of the liquid layer being about 0.4δ).

Card : 1/1

RUKENSHTEYN, E.

Effect of chemical reaction on mass transfer in a turbulent flow of liquid inside a tube. Zhur.prikl.khim. 38 no.6:1421-1424 Je '65. (MIRA 18:10)

1. Bukharestskiy politekhnicheskiy institut.

RUKENSHTEYN, E., Bucharest.

Efficiency of plates in the rectification process of binary mixtures. Zhur.prikl.khim. 30 no.7:1012-1016 Jl '57. (MIRA 10:10)
(Distillation apparatus)

RUKENSHTEYN, E.

Hatta - Pozin equation for the rate of absorption accompanied by rapid chemical reaction. Zhur. prikl. khim. 36 no.4:923-925 Ap '63. (MIRA 16:7)

(Absorption) (Chemical reaction, Rate of)

RUKENSHTEYN, E. [Ruckenstein, E.]; TEOREANU, I.

Process of mixing in a fixed or fluidized bed. Zhur. prikl. khim. 36 no.11:2426-2432 N '63. (MIRA 17:1)

1. Politekhnicheskiy institut, Bukharest.

AUTHORS: Fridlender, E., Rukenshteyn, E. SOV/56-35-1-14/59

TITLE: On the Nature of the Particles Which Carry Away Most of the Energy in Nuclear Collisions With Medium Energies (O prirode chastits, unosyashchikh osnovnuyu dolyu energii v yadernykh stolknoveniyakh pri umerennykh energiyakh)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 1, pp 1o4 - 11o (USSR)

ABSTRACT: It has recently been established by a number of experiments that in nuclear collisions with high energies the particles flying away include such as carry away most of the energy. In their introduction the authors discuss several papers (Shayn (Schein)-and HBD-stars (Refs 1 and 2)), nuclear-active components of cosmic radiation in the air (Refs 3,4), the structure of atmospheric showers (Refs 5,6), the theory by Landau (Ref 8), Heisenberg (Geyzenberg) (Ref 7), Belen'kiy (Ref 9) etc. The present paper aims at investigating the influence exercised by various factors upon the course of the transition curve for electron-nuclear showers in a dense absorbing medium. It is assumed that also for medium energies there exist

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so-called "energetically preferred particles" in every stage of the nuclear cascade process. For the purpose of determining the portion of the decaying particles in the generating component and the existence of unstable particles among those which are "energetically preferred" a comparison is drawn with absorption in air. Among the unstable energetically preferred particles there may be $\pi^{\pm}$ -, K_{μ}-, K_{e}- mesons but not Θ- or τ-mesons. However, in reference 26 mention is made of electro-nuclear showers, in which both the inciding as well as the emitted energetically-preferred particles occur in form of τ-mesons. In conclusion, the authors thank D.V.Skobel'tsyn, Academician, and the collaborators of the Laboratoriya kosmicheskikh luchey FIAN SSSR (Laboratory of Cosmic Radiation of the Physics Institute, AS USSR) for their critical discussion of this work and for their valuable comments. There are 26 references, 18 of which are Soviet.

On the Nature of the Particles Which Carry Away Most of the Energy in Nuclear Collisions With Medium Energies SOV/56-35-1-14/59

ASSOCIATION: Institut atomnoy fiziki pri Akademii nauk Rumynskoy narodnoy respubliki, Politekhnicheskiy institut, Bukharest (Institute of Nuclear Physics of the AS Rumanian People's Republic, Polytechnic Institute, Bucharest)

SUBMITTED: January 16, 1958

Card 3/3

RUKENSHTEYN, A. [Rukenshteĭn, A.]

Influence of the Marangoni effect on mass transfer under conditions of film flow. Int.-fiz. zhur. no.7:116-120 Jl '64. (MIRA 17:10)

1. Politekhnicheskiy institut, g. Bukhарest, Rumyniya.

RUKENSHTEYN, E.

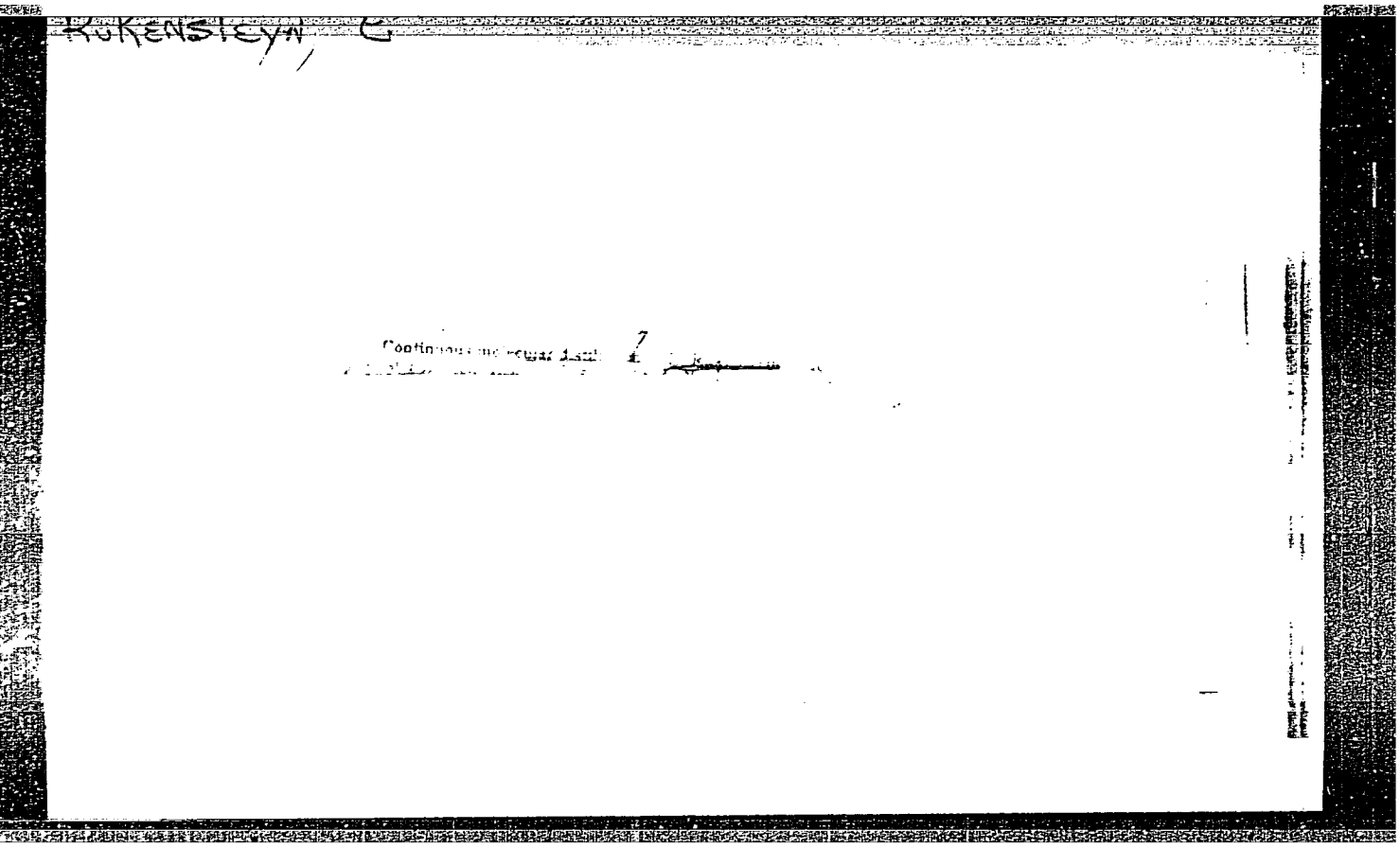
Coefficient of mass or heat transfer in the case of a turbulent flow. Zhur. prikl. khim. 36 no.5:1000-1008 My '63. (MIRA 16:8)

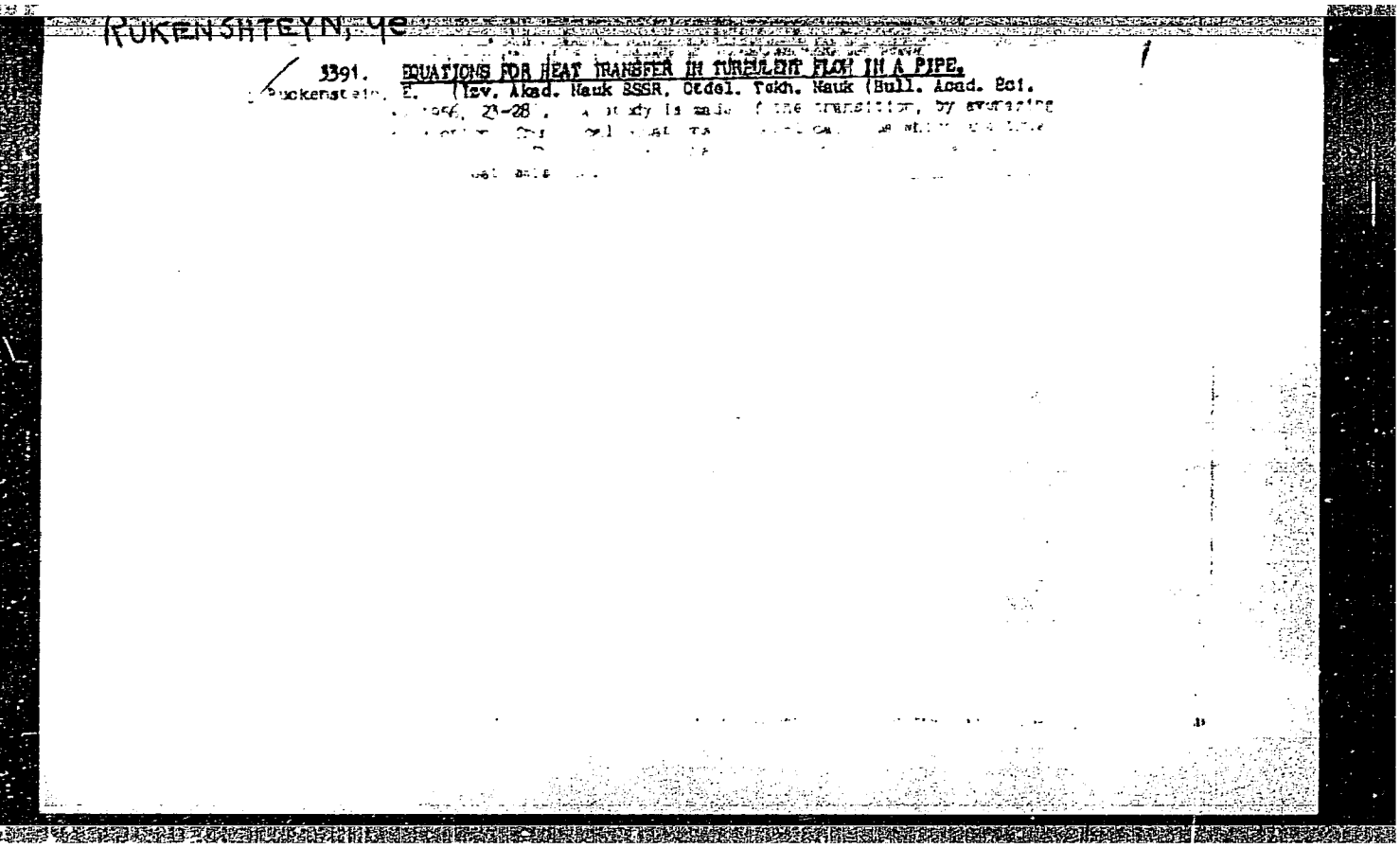
1. Bukharestskiy politekhnicheskiy institut.
(Chemical apparatus—Fluid dynamics)
(Mass transfer) (Heat—Transmission)

RUKENSHTEYN, E.

Heat or mass transfer between particles and the surrounding medium flowing past the particle. Zhur.prikl.khim. 35 no.2:377-384 F '62. (MIRA 15:2)

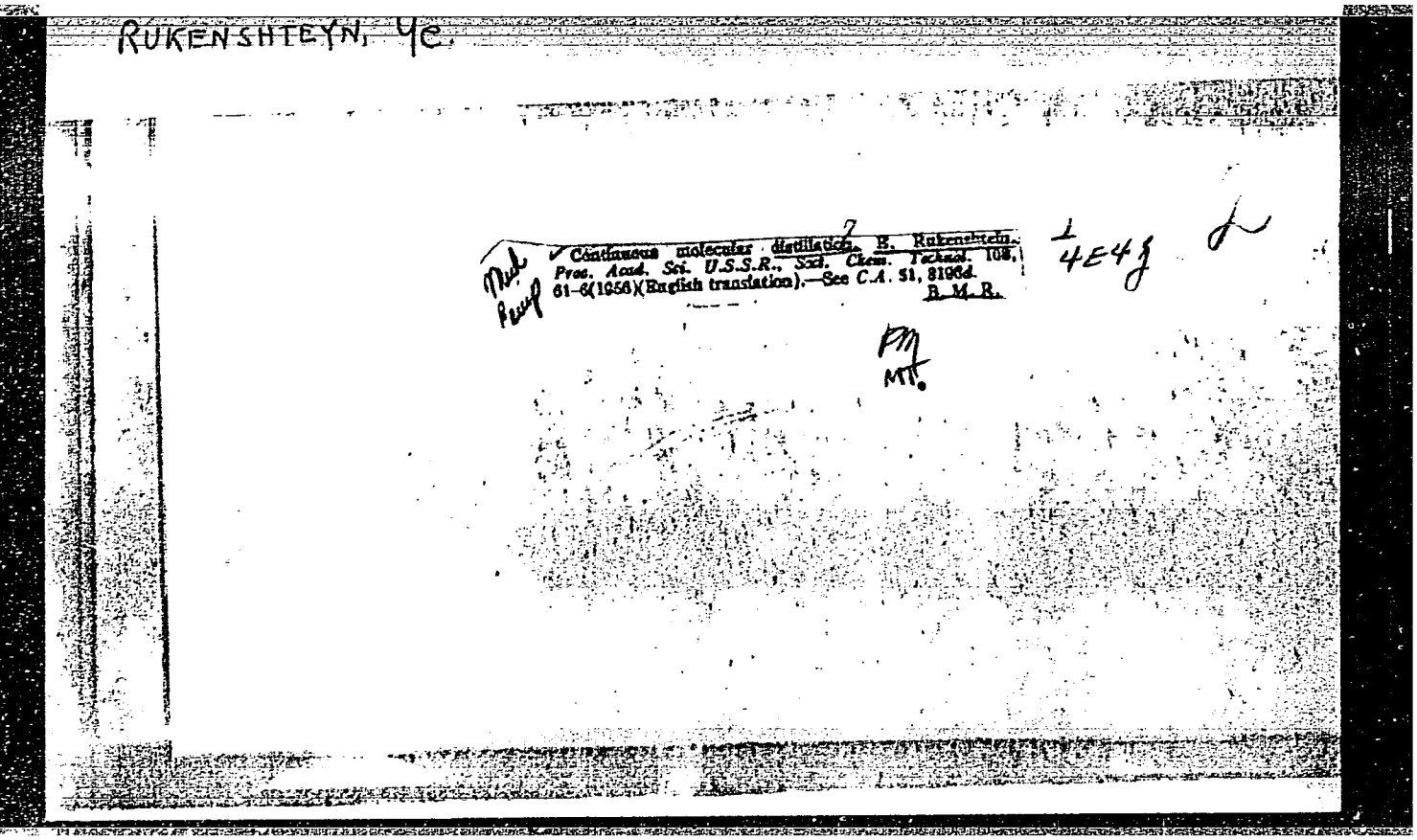
1. Bukhareskiy politekhnicheskiy institut.
(Mass transfer) (Heat--Transmission) (Fluidization)





RUKENSHTEYN, S.

3391. EQUATIONS FOR HEAT TRANSFER IN TURBULENT FLOW IN A PIPE.
Rukenstein, S. Izv. Akad. Nauk SSSR, Otdel. Tekh. Nauk (Bull. Acad. Sci.
[illegible], 23-28, [illegible] the transition, by evaluating



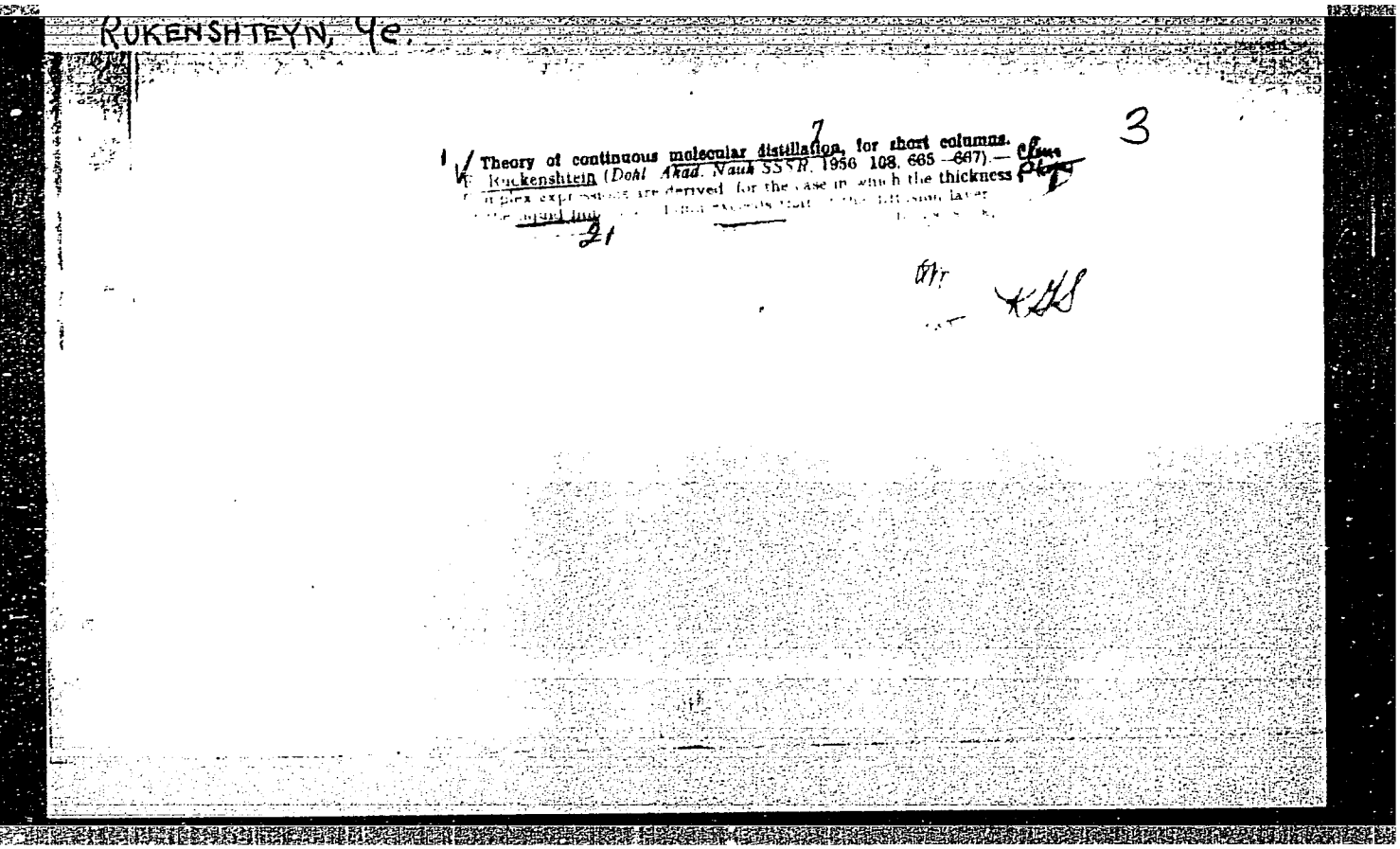
RUKENSHTEYN, Ye.

Continuous molecular distillation. E. Rukenshteĭn. *Proc. Acad. Sci. U.S.S.R., Sci. Chem. Technol.* 108, 61-6(1956)(English translation).—See *C.A.* 51, 8196d. B. M. R.

1 4E43

RUKENSHTEYN, Ye.

Continuous molecular distillation. R. Rukenstein (Bucharest Polytech. Inst.). *Doklady Akad. Nauk S.S.S.R.* 108, 518–21(1950).—Mol. distn. was studied analytically. The liquid contained several components, and flowed in a thin layer on a heated surface. The pressure inside the app. was so low, that the distance between the evapn. and condensation surfaces became smaller than the av. free path of the mols. Conditions were studied for stationary relations of the mols. of the j components of a liquid crossing in a unit time through a cross section perpendicular to the axis, and at a distance x from it. Conditions were considered for laminar flow; the diffusion time for all the components was very short in comparison with the time of descent of the liquid on the heated surface, and the diffusional penetration depth was greater than the thickness of the film on most of the heated surface. The theory of continuous molecular distillation in sufficiently short columns. *Ibid.* 605–7.—In this continuation of the above, the case is discussed when the diffusional penetration depth is less than the thickness of the liquid layer. W. M. Sternberg



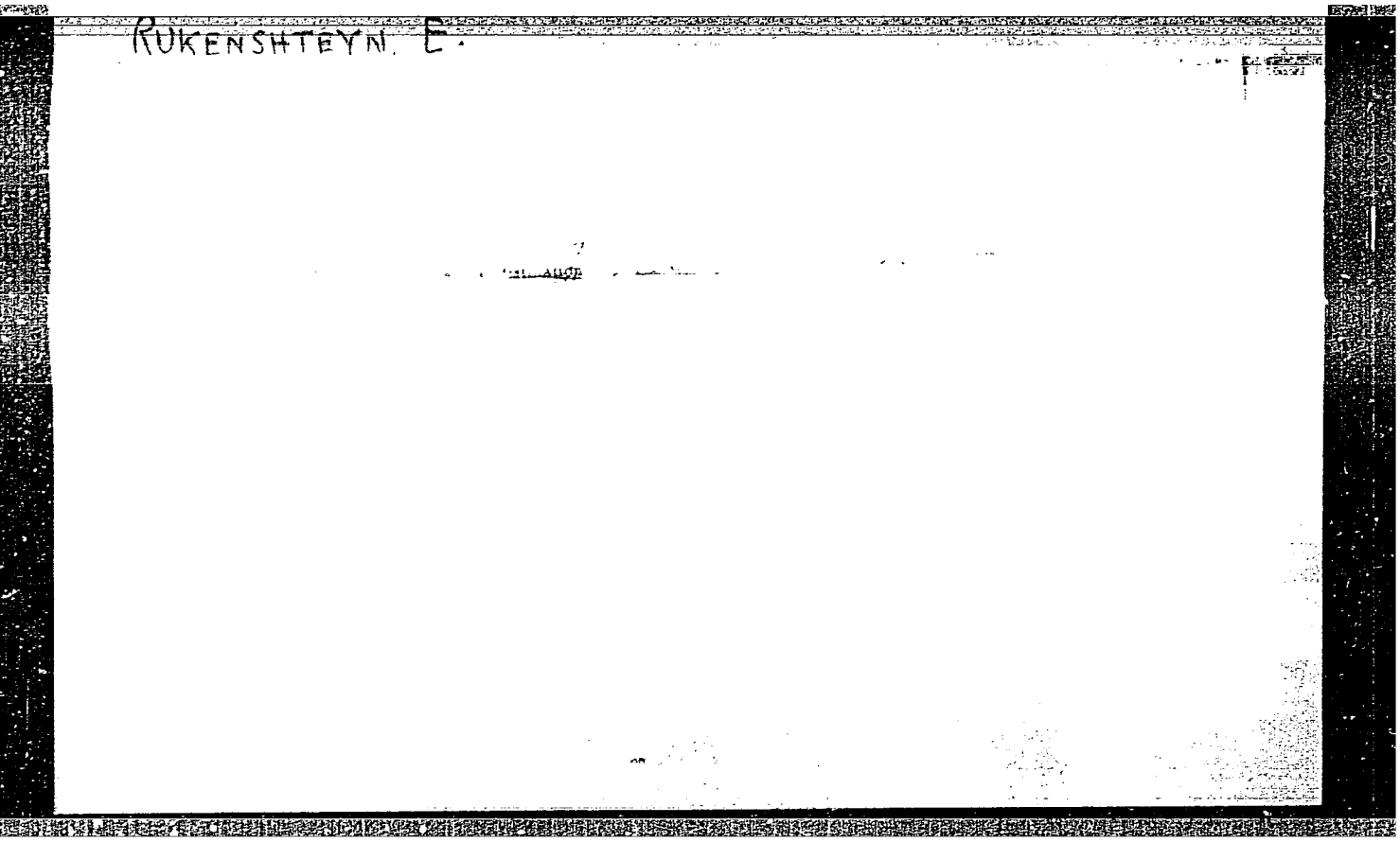
RUKENSHTEYN, Ye.

Theory of continuous molecular distillation for short columns. Ruckenshtein (Dokl. Akad. Nauk SSSR, 1956, 108, 665–667). — [illegible] are derived for the case in which the thickness [illegible]

RUKENSHTEYN, Ye.; SMIGEL'SKIY, O.

Activity coefficients for binary mixtures of nonelectolytes. Dokl. AN SSSR 111 no.6:1282-1285 D '56. (MLRA 10:3)

1. Politekhnicheskiy institut Bukharest, Rumynskaya Narodnaya Respublika Predstavleno akademikom.
(Activity coefficients)



L 53871-65 EWT(1)/EWP(m)/EPF(n)-2/EPR/EWA(d)/EWA(1) Pd-1/Ps-4/Pi-4/Pu-4

ACCESSION NR: AP5017250 UR/0170/64/000/007/0116/0120

AUTHOR: Rukenshteyn, E.

TITLE: Influence of the Marangoni effect on mass transfer in film flow

SOURCE: Inzhenerno-fizicheskiy zhurnal, no. 7, 1964, 116-120

TOPIC TAGS: mass transfer, fluid flow, surface tension, laminar flow, Reynolds number

ABSTRACT: The auantitative influence of the Marangoni effect on mass transfer in a liquid film flowing laminarly along a vertical wall is discussed with emphasis on the differences in the effect of surface tension for high and low Reynolds numbers. It it also shown that in the case of high Reynolds numbers, a correction must be made in the mass transfer equation for the effect on wave flow. Orig. art. has: 22 formulas.

ASSOCIATION: Politekhnicheskiy institut, Bucharest (Politechnical Institute)

SUBMITTED: 13Mar64 ENCL: 00 SUB CODE: ME, TD

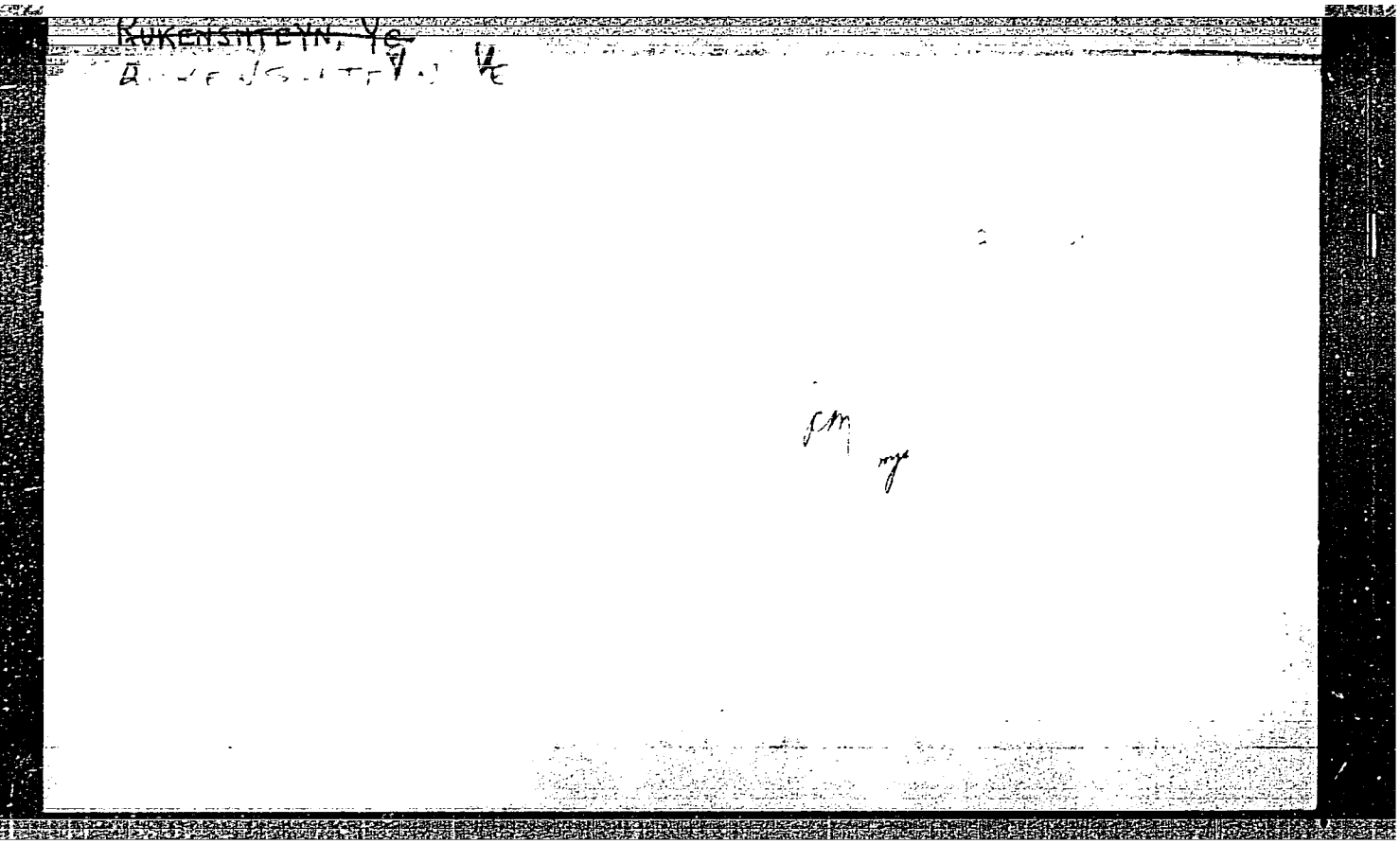
NR REF SOV: 008 OTHER: 006 JPRS

Card 1/1

RUKENSHTEYN, E.

Comments on the equation of convective diffusion. Inzh.-fiz. zhur. 7 no.12:121-122 D '64 (MIRA 18:2)

1. Politekhnicheskiy institut, Bukharest.



RUKENSHTEYN, E.

Nonadiabatic rectification. E. Rukenshtein (Polytech. Inst. Bucharest, Romania). *Doklady Akad. Nauk S.S.S.R.* 102, 687–90(1955).—A purely math. consideration of the behavior of a 2-component system in the nonadiabatic zone of a cylindrical rectifying column, where a thin film of liquid flows downward on the walls of the column, from above, and the vapors of the more volatile component have variable turbulent velocities in the free space of the zone.
V. H. Gottschalk

RUKENSHTEYN, Ye.

Stirring during the bubbling of vapors through the liquid on rectification column plates. Zhur. prikl. khim. 34 no.1:157-161 Ja '61. (MIRA 14:1)

1. Politekhnicheskiy institut, Bukharest.
(Plate towers)

RUKENSHTEYN, Ye.

Theory of continuous molecular distillation in the case of sufficiently short columns. Dokl.AN SSSR 108 no.4:665-667 Je '56. (MLRA 9:9)

1.Bukharestskiy politekhnicheskiy institut. Predstavleno akademikom A,N,Frumkinym.
(Distillation)

RUKENSTEYN, Ye.

Continuous molecular distillation. Dokl.AN SSSR 108 no.3:518-521 My '56. (MLRA 9:8)

1. Bukharestskiy politekhnicheskiy institut. Predstavleno akademikom A.N. Frumkinym.
(Distillation)

RUKENSHTEYN, Ye

USSR/ Chemistry - Chemical technology

Card 1/1 Pub. 22 - 44/62

Authors : About nonadiabatic rectification

Title : Rukenshteyn, Ye.

Periodical : Dok. AN SSSR 102/3, 587 - 590, May 21, 1955

Abstract : Brief announcement is made on the formulation of numerous equations for transfers of nonlocal nature, i. e., equations which contain the mean concentrations and transfer coefficients of a given substance for a nonadiabatic column (zone of rectification column is nonadiabatic) with a downward moving liquid film. Results obtained by applying the equations to the study of certain binary chemical systems are listed. Two Rumanian references (1954 and 1955).

Institution : Politechnic Inst., Faculty of Industrial Chemistry, Bucharest, Rumania

Presented by: Academician A. N. Frumkin, April 1, 1955

RUKENSHTEYN, Ye.

Nonadiabatic rectification. Dokl. AN SSSR 102 no.3:587-590 My '55. (MLRA 8:9)

1. Politekhnicheskiy institut, fakul'tet industrial'noy khimii, Bukharest, Rumyniya. Predstavleno akademikom A.N.Frumkinym.

(Distillation, Fractional)

VISHNEVSKIY, A.M.; VISHNEVSKIY, E.A.; KUZNETSOV, T.A.; PETROV, A.V.; RUKEVICH, L.V.; ADEL'FINSKAYA, Ye.N., red.; SAYTANIDI, L.D., tekhn. red.

[Manual on sugar-beet seed production] Spravochnik po sveklovichnomu semenovodstvu. Moskva, Izd-vo M-va sel'.khoz. RSFSR, 1961. 90 p. (MIRA 15:3)

1. Ministerstvo sel'skogo khozyaystva RSFSR (for all except Adel'finskaya, Saytanidi).
(Sugar beets)

ZAGRANICHNYY, V.I.; RUKEVICH, O.S.

Equilibrium of the formation of melamine from urea. Khim. prom. 41 no.3:188-190 Mr '65. (MIRA 18:7)

ZAGRANICHNYY, V.I.; RUKEVICH, O.S.

Equilibrium in the formation of melamine from dicyanodiamide.
Zhur. prikl. khim. 37 no.2:433-441 F '64. (MIRA 17:9)

L 25377-65 EWT(1)/EWG(k)/EPA(sp)-2/T/EEC(t)/EPA(w)-2/EWA(m)-2 Pz-6/Po-4/Pab-10/Pi-4
IJP(c) AT

ACCESSION NR: AP5004389 S/0056/65/048/001/0151/0157

56
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AUTHOR: Rukhadze, A. A.; Shpigel', I. S. 21

TITLE: Stabilization of plasma flute instability by an inhomogeneous electric field

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 1, 1965, 151-157

TOPIC TAGS: plasma instability, flute instability, plasma hydrodynamics

ABSTRACT: The authors propose to stabilize flute instability of a plasma by means of an inhomogeneous electric field, and investigate the conditions for such stabilization by using two-fluid hydrodynamics of a plasma. It is shown that the flute instability can be stabilized either by the inhomogeneous field which is produced in the plasma itself by the decrease in the particle density towards the plasma boundary, in which case the inhomogeneous field is usually concentrated on the plasma surface, or by an electric inhomogeneous field produced in the plasma by artificial means. An approximate criterion is derived for the magnitude of the azimuthal component of the polarization field necessary

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ACCESSION NR: AP5004389

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to stabilize the flute instability. Quantitative relations are derived for an inhomogeneous plasma with plane or cylindrical geometry. Dispersion relations for the spectra of the flute oscillations are derived in the geometrical-optics approximation, and local criteria for the stabilization of the flute instabilities are established. Effective stabilization is shown to be possible when the dimension of the inhomogeneity of the electric field is smaller than the characteristic dimension of the plasma inhomogeneity (i.e., the transverse plasma dimension), if the field itself is larger than or comparable with the thermal field. The stabilization does not depend on the sign of the electric field and is due to the fact that the field is capable of deforming the flute within a time that is much shorter than the time necessary for the flute instability to develop. It is stated in the conclusion that some experimentally observed stabilizations of flute instability in various devices may be connected with the stabilization mechanism described in the present article. "The authors thank M. S. Rabinovich, V. P. Silin, and I. S. Danilkin for valuable advice and discussion." Orig. art. has: 17 formulas. [02]

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute, Academy of Sciences, SSSR)

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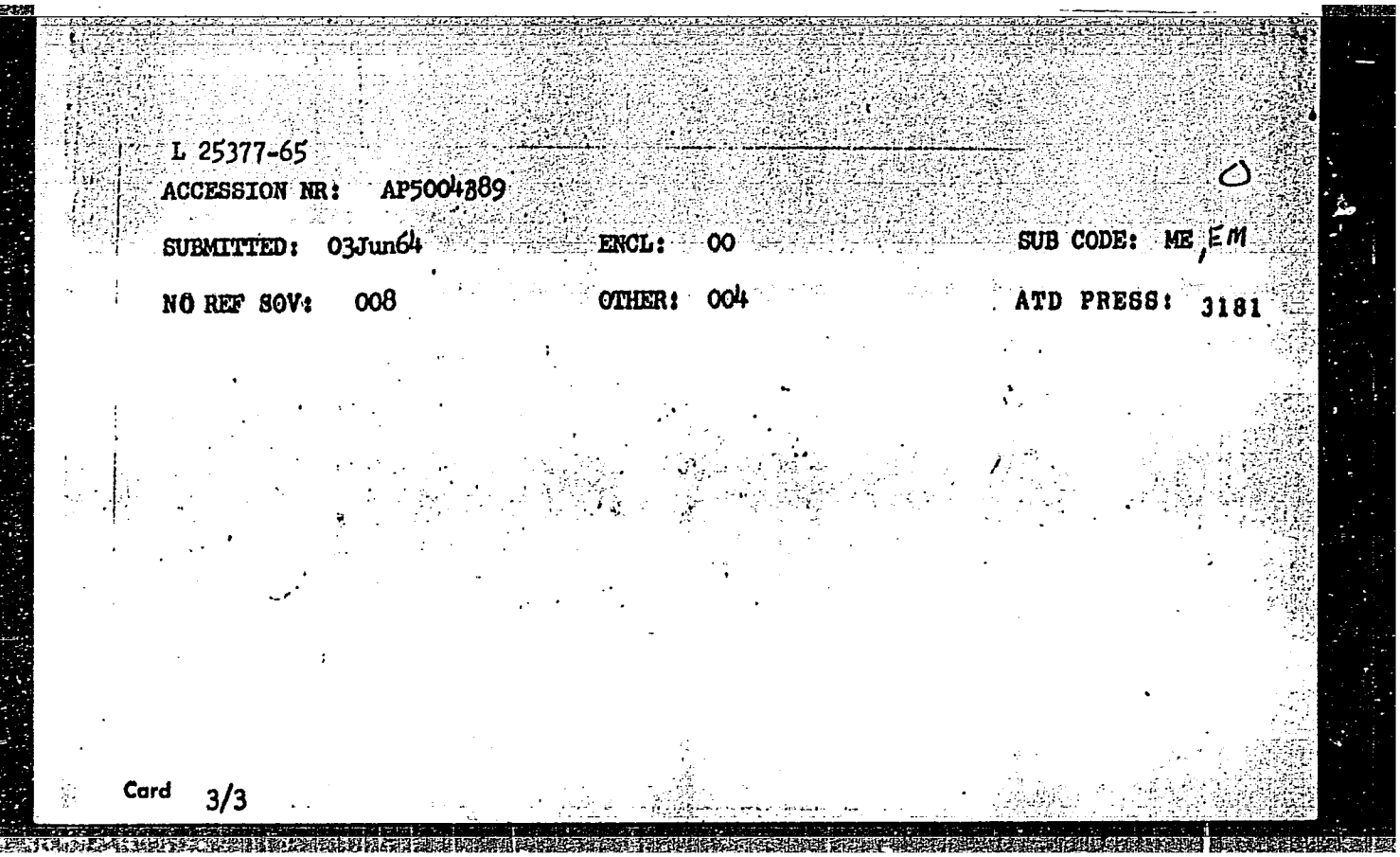

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USSR/Nuclear Physics - Nucleon Interaction RUKHADZE, A.A. FD-3390

Card 1/1 Pub. 146-28/28

Author : Rukhadze A. A.

Title : Problem of nucleon interaction through a pseudoscalar mesonic field (Letter to the editor)

Periodical : Zhur. Eksp. i Teor. Fiz., 29, No 5, 709-711, 1955

Abstract : Tamm's quantum theory of relativistic particles (Journ of Phys., 5, 1, 1945) is applied to equations of nucleonic interaction through a mesonic pseudoscalar field. Attempt is made to eliminate divergencies in computations. Two USSR and two foreign references.

Institution : Physics Institute im. Lebedev, Acad. Sci. USSR

Submitted : February 9, 1955

FD-3275

RUKHADZE, A. A.

USSR/Nuclear Physics - Pi meson interaction with nucleons

Card 1/1 Pub. 146 - 34/44

Author : Popov, Yu. M.; Rukhadze, A. A.

Title : Inelastic scattering of mesons in the semiphenomenological theory of the interaction of pi-mesons with nucleons

Periodical : Zhur. eksp. i teor. fiz., 29, No 6(12), Dec 1955, 893

Abstract : On the basis of the semiphenomenological theory of interaction of pi-mesons with nucleons, the problem of the nonelastic scattering of pi-mesons by nucleons was solved for energy of the incident mesons greater than 400 Mev (I, Ye. Tamm, Yu. A. Gol'fand, V. Ya. Faynberg, ibid., 26, 649, 1954), the calculation conducted in the first non-disappearing approximation of Heitler's theory of damping (W. Heitler, Proc. Cambr. Phil. Soc., 37, 291, 1941). They studied, after scattering, the states: nucleon+meson and "isobar"+meson, but did not consider the state nucleon+two mesons, formation of the second meson being considered as a decay of the nucleon's "isobar" state. In the present note the writers carry out a comparison with experiments for energies of the incident mesons higher than 400 Mev, and note that up to 400 Mev their results coincide with those of Tamm et alii (op. cit.). This note contains no new values of the constants not already given by Tamm et alii. Results are given in graph and table, theoretical and experimental. Good agreement is noted. Four references, all Western but one USSR (op. cit.).

Institution: Physical Institute im. P. N. Lebedev, Acad. Sci. USSR

Submitted : July 29, 1955

Rukhadze AA.

ANISHCHENKO, Yu.V.; RUKHADZE, A.A.

Polarization in double electron scattering. Zhur. eksp. i teor. fiz. 33 no.1:279-280 Jl '57. (MLRA 10:9)

1. Fizicheskiy institut im. P.N. Lebedeva Akademii nauk SSSR.
(Electrons--Scattering)

RUKHADZE, A. A.

56-7-48/66

AUTHOR: ANISHCHENKO, Yu.V., RUKHADZE, A.A.

TITLE: Polarization on the Occasion of the Double Scattering of Electrons. (Polyarizatsiya pri dvukratnom rasseyanii elektronov - Russian)

PERIODICAL: Zhurnal Eksperim. i Teoret.Fiziki,1957, Vol 33, Nr 7, pp 279-280, (U.S.S.R.)

ABSTRACT: The longitudinal polarization of the electrons of the ß-decay manifests itself on the occasion of the twofold scattering of the ß-electrons. The differential cross section of the double scattering of a longitudinally polarized beam of electrons is here explicitly written down. These formulae are then specialized for Born's approximation. The following facts were established: The effect produced by the azimuthal asymmetry in the case of the double scattering of the polarized beam of electrons is considerably greater than the effect produced by the azimuthal asymmetry of the scattering of a non-polarized beam. If the recoil of the nucleus is disregarded and in the case of the neutrino with two components the relation $\eta = v/c$ applies to the degree of longitudinal polarization of the ß-electrons. Experiments carried out in connection with the double scattering of a polarized beam are rendered considerably more difficult by the relatively low activity of the ß-active preparations. They are however, of considerable interest in connection with the verification of the above mentioned calculations and for the explanation of the phenomenon of ß-decay. At present endeavors are being made to verify this phenomenon experimentally. In conclusion a possible

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Polarization on the Occasion of the Double Scattering of Electrons. 56-7-48/66

connection between double scattering and the so-called "anomalous scattering" of electrons is pointed out.
(No illustrations).

ASSOCIATION Physical Institute"P.N. LEBEDEV" of the Academy of Sciences of the U.S.S.R. (Fizicheskiy institut im. P.N. Lebedeva Akademii nauk SSSR)

SUBMITTED 19.3.1957.
AVAILABLE Library of Congress.
Card 2/2

RUKHADZE, A. A., Cand Phys-Math Sci -- (diss) "Interaction of two nucleons in the Tamm-Dankov method." Mos, 1958. 8 pp (Acad Sci USSR, Phys Inst im P. N. Lebedev), 125 copies. (KL, 17-58, 105) Bibliography: p 8 (14 titles) (KL, 17-58, 105)

AUTHOR: Rukhadze, A. A. 56-34-4-42/60

TITLE: The Elastic Scattering of Particles With High Energy by a Deuteron (Ob uprugom rasseyanii chastits vysokoy energii na deytrone)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 4, pp. 1014 - 1015 (USSR)

ABSTRACT: In the recently arranged experiments by L.S.Leskin (Ref 2) on the scattering of 675 MeV protons by deuterons, besides scattered nucleons, also a small number of not anibilated high-energy deuterons is observed (up to 660 MeV). The present report gives the quantitative estimation of the relative probability of this process using the wave function of the deuteron obtained according to the method by Tamm-Dankov (Ref 3). With sufficiently small λ

$w_d(\lambda) \approx 4\pi \int_0^{\lambda} \psi_d^2(r)\, r^2 dr \approx (4\pi/3)\psi_d^2(0)\lambda^3$ is obtained; where

$w_d(\lambda)$ denotes the relative probability of the investigated process, λ the wave length of the impinging particle, and $\psi_d(r)$-

Card 1/3 the wave function of the deuteron. The above mentioned expression

holds for sufficiently small λ . In the case of small distances the wave function of the deuteron obtains practically only one $^3S_1$-wave. It therefore holds that $\psi_d(0) = \lim_{r \to 0}(u(r)/r)$, where u(r) denotes the function of the $^3S_1$-state of the deuteron. Using the values of u(r) calculated by the method developed by Tamm-Dankov $\psi_d(0) \approx 0,7$ is found and the expression $\omega_d(\lambda) \approx 4\pi\lambda^3/3$ results in the system of units $\hbar = \mu_\pi = c = 1$. When the impinging protons have the energy 675 MeV it holds that $\lambda = 0,1$ and consequently $w_d(\lambda) = 2.10^{-3}$. The experimental value of this magnitude is 7.10^{-3} (Refs 1,2). Thus theory experimentally coincides with the experiment. The experimental investigation of the scattering of fast particles by a deuteron and the comparison of the energy dependence of the relative probability of the elastic scattering of fast particles by a deuteron by means of the first mentioned formula would be of interest. Finally the author thanks I.Ye.

The Elastic Scattering of Particles With High Energy by a Deuteron 56-34-4-42/60

Tamm, Member, Academy of Sciences, USSR, for raising the problem.
There are 3 references, which are Soviet.

SUBMITTED: January 8, 1958

1. Deuterons---Nuclear reactions

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24 (5)
AUTHOR: Rukhadze, A. A.

SOV/56-35-2-32/60

TITLE: Concerning the Problem of the Interaction of Two Nucleons in the Method of Tamm-Dankov (K zadache vzaimodeystviya dvukh nuklonov v metode Tamma-Dankova)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 2 (8), pp 511-512 (USSR)

ABSTRACT: According to a previous paper it is possible, in the investigation of a two-nucleon system according to the Tamm-Dankov method, to contine oneself to the two-meson approximation of this method. In this case, the terms of the order of magnitude g^4 are essential only in the non-relativistic region of the energy of the interacting particles. But the interaction in the relativistic energy region is described only by terms of the order of magnitude g^2. According to this conclusion, the exact equations for the amplitude of the state of the two-nucleon system can be replaced by approximated equations in which the terms with the order of magnitude g^4 are taken into account

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only in an adiabatic manner. The terms of the order of magnitude g^2, however, are exactly taken into account. This essentially simplifies the solution of the equations. Recently, these equations were integrated numerically by means of the electronic computer "Strela" of the AS USSR. The lowest eigenvalue of the coupling constant was found for the state $^3S_1 + {}^3D_1$ of a two-nucleon system. The system was assumed to be in a bound state with the binding energy $\varepsilon = 2{,}227$ MeV and, moreover, the problem was solved for the $^1S_0$ state with a given value of g^2. The wave functions for the states $^3S_1$ and $^3D_1$ of the deuteron (in the coordinate space) can be obtained by numerical integration. From the numerical solution of the equation for the scattering of nucleons in the $^1S_0$ state the phases of the scattering in this state can be deduced. A table gives the numerical results of the calculations for a deuteron and also a comparison of theoretical and experimental results.

A second table gives the numerical values of the phase $\delta(^1S_0)$ and compares them with the results obtained for various phenomenological potentials. The terms with the order of magnitude g^4 exercise only a minor influence on the interaction of the nucleons in the problem of the bound state of the deuteron, but they make an essential contribution to the scattering of the nucleons in the $^1S_0$ state. The theory describes the interaction of the nucleons for low energies ($T < 20$ MeV) with a qualitative exactitude. The author thanks I. Ye. Tamm, Member, Academy of Sciences, USSR, for this theme and also for his advice and discussions. The author also thanks N. N. Strelkova who carried out nearly all the calculations with the electronic computer "Strela", and he thanks N. Ye. Nikulkina who also carried out many calculations. There are 2 tables and 11 references, 2 of which are Soviet.

24(3)

AUTHORS: Agranovich, V. M., Rukhadze, A. A. SOV/56-35-4-24/52

TITLE: On the Propagation of Electromagnetic Waves in a Medium Taking Account of Spatial Dispersion (O rasprostranenii elektromagnitnykh voln v srede pri uchete prostranstvennoy dispersii)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 4, pp 982 - 984 (USSR)

ABSTRACT: V.L.Ginzburg and S.I.Pekar (Refs 2,1) developed a method for the investigation of the propagation of electromagnetic waves in media, taking the spatial dispersion of the dielectricity constant into account. Whereas Ginzburg dealt with the problem by the phenomenological method, Pekar employed microscopical means of determining the connection between the polarization $\vec{P}$ and the electric field strength $\vec{E}$. The two methods in some essential points lead to different results, and the authors of this paper endeavor to clear matters up by trying to improve Ginzburg's method. First it is shown that, for the

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purpose of investigating the connection between the macroscopic quantities $\vec{P}$ and $\vec{E}$, the microscopical method is not suited. The equation of motion for the wave is obtained from an energy equation by development of $\vec{P}$,$\vec{E}$, and $\vec{D}$ according to Fourier (Fur'ye) components and corresponding transformation. For the case that the medium contains no free charges, an equation is set up (Maxwell) for the connection between $\vec{D}$ and $\vec{P}$. For transversal and longitudinal waves the refraction index is further represented in dependence on ω, and an equation is given for $n(\omega)$ also for anisotropic media; the properties of the medium are represented by the corresponding tensor components. The latter equation shows, according to Ginzburg (Ref 3) that taking account of the spatial dispersion in cubic crystals leads to a weak anisotropy of the refraction index. In conclusion, the authors thank V.L.Ginzburg for valuable discussions. There are

On the Propagation of Electromagnetic Waves in a Medium SOV/56-35-4-24/32
Taking Account of Spatial Dispersion

5 references, 4 of which are Soviet.

SUBMITTED: May 9, 1958

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SOV/56-35-5-17/56

24(5)

AUTHORS: Agranovich, V. M., Rukhadze, A. A.

TITLE: Energy Losses of the Electron in a Medium With Spatial Dispersion (Energeticheskiye poteri elektrona v srede s prostranstvennoy dispersiyey)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 5, pp 1171-1174 (USSR)

ABSTRACT: Ginzburg (Ref 1) already investigated the propagation of electromagnetic waves in a general form in a medium in consideration of spatial dispersion. Taking account of this dispersion is especially important near the eigenfrequencies of the medium. For this frequency range a theory of the optical properties of the medium has already been developed by the authors of the present paper (Ref 3) as well as by Pekar (Ref 2). The influence exercised by the consideration of spatial dispersion on the energy losses of electrons moving in the medium is now to be investigated. For this purpose the authors base their investigations on the Maxwell (Maksvell) equations for an electron moving with the velocity v in an anisotropic medium with an arbitrary spatial dispersion law. In this system the quan-

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Energy Losses of the Electron in a Medium With Spatial Dispersion

tities $\vec{E}$, $\vec{D}$, and $\vec{H}$ are represented by their Fourier (Fur'ye) components and an expression for the energy loss F suffered by the electron on one unit of length of its path is written down. In nonrelativistic approximation this amounts to:

$F = -\frac{ie^2}{2\pi^2 v}\int\frac{(\vec{q}\vec{v})}{(\vec{q},\hat{\varepsilon}\vec{q})}\,d\vec{q}$. The example of an isotropic nongyrotropic medium with an arbitrary dispersion law is investigated and also for this case F is explicitly given. Also for the case of an excitation of a longitudinal wave in a medium, if spatial dispersion is taken into account, a formula for F is given (also in the relativistic case). Explicit expressions are derived also for the ε-tensor. Finally, also for an isotropic nongyrotropic medium (according to reference 5) a formula is derived for the relativistic case for the total energy losses $F = F(\omega,k)$. The authors finally thank V. L. Ginzburg for his constant interest in this work and for his valuable discussions. There are 5 Soviet references.

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21(7)

AUTHORS: Agranovich, V. N., Pafomov, V. Ye., Rukhadze, A. A.

SOV/56-36-1-32/62

TITLE: On the Cherenkov Radiation of an Electron Moving in a Medium With Spatial Dispersion (O cherenkovskom izluchenii elektrona, dvizhushchegosya v srede s prostranstvennoy dispersiyey)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 1, pp 238-243 (USSR)

ABSTRACT: The present paper deals with Vavilov-Cherenkov radiation in an isotropic gyrotropic medium in consideration of spatial dispersion. The formula for the total losses, which corresponds to this case, is written down. In consideration of spatial dispersion, Cherenkov radiation propagates on the surface of cones with the aperture angle ϑ_i. The next chapter of this paper deals with the distribution of intensities over these cones. The formula for the total intensity of Cherenkov radiation here takes the form of a sum of the intensities distributed over the individual Cherenkov cones. For a more intense study of the distribution of the intensity of Cherenkov radiation, the author investigates several possibilities of taking the spatial dispersion of the medium into account. For

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frequency ranges which are far from the eigenfrequencies of the medium it is possible to determine the solution for the decomposition of "direct" dispersion. Within this frequency range it holds uniquely that $n^2(\omega) = \varepsilon_c(\omega)/(1+\alpha(\omega))$, and Cherenkov radiation will be distributed over the surface of a single cone. In the domains near the eigenfrequencies of the medium, spatial dispersion may be of essential influence and in this case a development of the "inverse" dispersion must be used. Assuming that the condition $\varepsilon_c^2|\beta| \ll 1$ holds, one may say that Cherenkov radiation is concentrated almost entirely upon the first cone. Also with $\beta > 0$ Cherenkov radiation is distributed over one cone, but with $\beta < 0$ it is distributed over two. In nongyrotropic media the new Cherenkov radiation is real only in the immediate neighborhood of the absorption line center, and in this case the new Cherenkov radiation is of the same order of magnitude as the intensity of the ordinary Cherenkov radiation. In real substances Cherenkov radiation . . . .

in the optical spectral range can be observed in films of about $\sim 10^{-4}$ cm. The authors then investigate Cherenkov radiation in an isotropic gyrotropic medium in consideration of spatial dispersion, confining themselves to decomposing "inverse" dispersion. Such a radiation occurs if the condition $v > c/n_i(\omega)$ is satisfied. Here $n_i(\omega)$ denotes one of the solutions of the equation $n^2(\omega) = \varepsilon_1(\omega, n^2\omega^2/c^2)$.

An expression is written down for the total intensity of Cherenkov radiation. In a gyrotropic medium absorption is not of essential importance, and the new waves of Cherenkov radiation can actually be observed experimentally. The third and last chapter deals with the emergence of Cherenkov radiation through the surface of the medium. The results obtained in this paper by calculation make it possible to decide upon the most favorable geometric experimental conditions for the investigation of the special features of Cherenkov radiation in media with spatial dispersion. In conclusion, the authors thank V. L. Ginzburg for his interest

in this work and for discussions. There are 5 Soviet references.

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

SUBMITTED: July 10, 1958

RUKHADZE, A.A.; SILIN, V.P.

Magnetic susceptibility of relativistic electron gas. Zhur.eksp.i teor.fiz. 38 no.2:645-646 F '60. (MIRA 14:5)

1. Fizicheskiy institut im. P.N.Lebedeva Akademii nauk SSSR.
(Electron gas)

KOVRIZHNYKH, L.M.; RUKHADZE, A.A.

Instability of longitudinal oscillations of an electron-ion plasma. Zhur.eksp.i teor.fiz. 38 no.3:850-853 Mr '60. (MIRA 13:7)

1. Fizicheskiy institut im. P.N.Lebedeva Akademii nauk SSSR.
(Plasma (Ionized gases))

PHASE I BOOK EXPLOITATION SOV/5782

Silin, Viktor Pavlovich, and Anri Amvrosiyevich Rukhadze

Elektromagnitnyye svoystva plazmy i plazmopodobnykh sred (Electromagnetic Properties of Plasma and Plasma-Like Media) Moscow, Gosatomizdat, 1961. 243 p. Errata slip inserted. 6,500 copies printed.

Ed.: A. V. Matveyeva; Tech. Ed.: S. M. Popova.

PURPOSE: This book is intended for scientists concerned with the physics of plasma.

COVERAGE: The authors consider the current theoretical and experimental literature on problems of space dispersion of the dielectric constant in its application to material media to be inadequate. Analyzing the latest development in kinetic presentations on plasma and the discovery and interpretation of the abnormal skin effect, they conclude that these developments clearly indicate that under specific conditions space

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dispersion of the dielectric constant appears to be extremely strong. In this sense, space dispersion of the dielectric constant enters the field of electrodynamics by the same right as frequency dispersion. Ch. I presents the fundamentals of electromagnetic media with space dispersion and describes the latest developments in the field. Basic material necessary for comprehension of the theoretical presentation of the electromagnetic properties of solid-state media in the following chapters is included. Chs. II and III discuss the application of the macroscopic approach to the study of plasma physics; Ch. IV is concerned with the quantum plasma of metals; and Ch. V deals with the theory of space dispersion of the dielectric constant. Because space dispersion manifests itself with special intensity in plasma, the authors have originated the term "plazmopodobnaya sreda" (plasma-like medium) to describe a medium possessing considerable space dispersion. Secs. 1, 4, 5, 10 to 18, 24, 26 to 30, and the Appendix were written by V. P. Silin; Secs. 2, 3, 6 to 9, 19 to 23, and 25 by A. A. Rukhadze; and Sec. 31, jointly. The authors thank M. A. Leontovich,

L. S. Bogdankevich, V. L. Ginzburg, and S. I. Syrovatskiy.
There are 300 references: 216 Soviet (including 5 translations), 76 English, 5 German, and 3 French.

TABLE OF CONTENTS:

24.7700 (1137, 1138, 1160, 1462) 24927 S/181/61/003/006/024/031
B102/B214

AUTHORS: Ginzburg, V. L., Rukhadze, A. A., and Silin, V. P.

TITLE: Electrodynamics of crystals and the exciton theory

PERIODICAL: Fizika tverdogo tela, v. 3, no. 6, 1961, 1835 - 1850

TEXT: The present paper gives a detailed theoretical treatment of the general problem of the application of the electrodynamics of matter with spatial dispersion to crystals. The authors confine themselves particularly to the investigation of the approximations one obtains when one works with $\varepsilon_{ij}(\omega,\vec{k})$, the tensor of the complex dielectric constant.

First the fundamental equations of the electrodynamics of matter with spatial dispersion are written down. They are in the usual notations:

$\mathrm{curl}\vec{B} = \frac{1}{c}\frac{\partial\vec{D}'}{\partial t} + \frac{4\pi}{c}\vec{j}_0$; $\mathrm{div}\vec{D}' = 4\pi\varrho_0$; $\mathrm{curl}\vec{E} = -\frac{1}{c}\frac{\partial\vec{B}}{\partial t}$; $\mathrm{div}\vec{B} = 0$; $\vec{F} = e(\vec{E}+\frac{1}{c}[\vec{v}\vec{B}])$, the force acting on a point charge moving with velocity $\vec{v}$; for the electric induction $\vec{D}'$ one has $\partial\vec{D}'/\partial t = \partial\vec{E}/\partial t + 4\pi\vec{j}$. For plane monochromatic waves, $\vec{D}'$ and $\vec{E}$ are interrelated by:

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$$D'_i(k, \omega) = \varepsilon_{ij}(\omega, k) E_j(k, \omega); \quad E_i(k, \omega) = \varepsilon^{-1}_{ij}(\omega, k) D'_j(\omega, k), \quad (1,6)$$

$$\varepsilon_{ij}(\omega, k) = \int_0^\infty d\tau \int d\mathbf{R} e^{i(kR-\omega\tau)} \hat{\varepsilon}_{ij}(\tau, R). \quad (1,7)$$

For crystals one has

$$\left.\begin{aligned} D'_i(r, \omega) &= \int dr' \varepsilon_{ij}(\omega, r, r') E_j(r', \omega), \\ D'_i(k, \omega) &= \int dk' \varepsilon_{ij}(\omega, k, k') E_j(k', \omega). \end{aligned}\right\} \quad (1,8)$$

It is shown that in crystals in the optical region the tensor $\varepsilon_{ij}(\omega,\vec{k},\vec{k}')$ can be reduced to the tensor $\varepsilon_{ik}(\omega,\vec{k})$ in the usual way. If the normal electromagnetic waves have the form $\vec{E}_1 = \vec{E}_{o1} e^{i(\vec{k}\vec{r}-\omega t)}$, $\vec{B}_1 = \vec{B}_{o,1} e^{i(\vec{k}\vec{r}-\omega t)}$, $\vec{E}_{o,1}$ = constant, $\vec{B}_{o1}$ = constant (spatially homogeneous medium) one has for $j_o = 0$,

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Electrodynamics of...

$$\left.\begin{aligned} \mathbf{D}' &= -\frac{c}{\omega}[\mathbf{kB}], \quad \mathbf{B} = \frac{c}{\omega}[\mathbf{kE}], \\ \mathbf{D}' &= \frac{c^2}{\omega^2}\{k^2\mathbf{E} - \mathbf{k}(\mathbf{kE})\}, \\ \frac{\omega^2}{c^2}\varepsilon_{ij}E_j &- k^2E_i + k_ik_jE_j = 0. \end{aligned}\right\} \qquad (1,13)$$

or, in the determinantal representation $\Delta_1(\omega,\vec{k}) = \left|\frac{\omega^2}{c^2}\varepsilon_{ij}(\omega,\vec{k}) - k^2\delta_{ij} + k_ik_j\right| = 0$, or $\Delta_2(\omega,\vec{k}) = \left|\frac{\omega^2}{c^2}\delta_{ij} - k^2\varepsilon^{-1}_{ij}(\omega,\vec{k}) + k_ik_l\varepsilon^{-1}_{ij}(\omega,\vec{k})\right| = 1$ (Δ or $\|$ denote the determinants of the system of linear homogeneous equations). Starting from these equations the authors investigate in the following the properties of the tensor $\varepsilon_{ij}(\omega,\vec{k})$ in crystals, as well as the possibility of calculating this tensor quantum-mechanically. First, the effect of taking into consideration the space inhomogeneity is investigated. (1.8) may be written in the form $\varepsilon_{ij}(\omega,\vec{k},\vec{k}') = \sum_{\vec{b}}\delta(\vec{k}'-\vec{k}-2\pi\vec{b})\varepsilon^{\vec{b}}_{ij}(\omega,\vec{k})$, where $\vec{b} = \sum_{i=1}^{3} n_i\vec{b}_i$ is an arbitrary vector of the reciprocal lattice. The relation between

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Electrodynamics of...

$\vec{D}$ and $\vec{E}$ is given by

$$k_i k_j E_j(\omega, \mathbf{k}) - k^2 E_i(\omega, \mathbf{k}) + \frac{\omega^2}{c^2} \sum_b \varepsilon_{ij}^b(\omega, \mathbf{k}) E_j(\mathbf{k} + 2\pi\mathbf{b}, \omega) = 0. \quad (2,3)$$

whose determinant leads to the dispersion equation $\Delta(\omega, \vec{k}) = 0$ with roots $\omega = \omega_1(\vec{k})$. If all terms with $b \neq 0$ are eliminated from (2.3) which is justified for the region with $k \ll b \sim 1/a$; $\omega \ll cb \sim c/a$), considered here one obtains for $\vec{E}(\omega, \vec{k})$ analogous to (1.13): $k_i(\vec{k}\vec{E}) - k^2 E_i + (\omega^2/c^2)\varepsilon_{ij}(\omega, \vec{k})E_j = 0$. Here $\varepsilon_{ij}(\omega, \vec{k})$ differs from $\varepsilon_{ij}^{b=0}(\omega, \vec{k})$ only by terms of the order of $(a/\lambda_0)^2$. In optics, not only is $(a/\lambda_0)^2 \ll 1$, but it can also be assumed that $a/\lambda = an/\lambda_0 \ll 1$ (a-lattice constant, λ_0-vacuum wavelength). This is done in the following, i. e., the spatial dispersion is assumed to be small. One may then expand $\varepsilon_{ij}(\omega, \vec{k})$ in series of powers of $\vec{k}$ and neglect terms of higher order than the second. Near the absorption lines where some components of $\varepsilon_{ij}(\omega)$ become very large one must expand analogously the reciprocal tensor of (1.6): $\varepsilon_{ij}^{-1}(\omega, \vec{k}) = \varepsilon_{ij}^{-1}(\omega) + ig_{ijl}\frac{\omega}{c}\tilde{n}s_l + \beta_{ijlm}(\omega/c)^2 \tilde{n}^2 s_l s_m$,

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where $\vec{k} = \frac{\omega}{c}\tilde{n}\vec{s}$, $\tilde{n} = n'+in''\equiv n+i\varkappa$. These expansions are not justified in all the cases (e. g. for absorption lines caused by a quadrupole transition). In the following the longitudinal waves and "mechanical excitons" are studied. Besides the longitudinal wave solution $|\varepsilon_{ij}(\omega,\vec{k})| = 0$ there exist other solutions of the field equations corresponding to "fictitive" longitudinal waves. It is, however, sufficient to observe in the domain of classical crystal optics that waves with $\vec{D}' = 0$ become longitudinal when $n^2 \to \infty$. Eq. (1.13) is investigated in this case in the form $\vec{D}' = \tilde{n}^2\{\vec{E} - \vec{s}(\vec{sE})\}$, $\vec{k} = (\omega/c)\tilde{n}(\omega)\vec{s}$ $(k\to\infty)$, and the relation $\varepsilon_{ij}(\omega,\vec{k})s_i s_j = 0$ obtained. Only in this case, $\vec{D}'$ and $\vec{E}$ are different from zero. If $\vec{E} = 0$ and $\vec{D}' \neq 0$, the condition $|\varepsilon^{-1}_{ij}(\omega,\vec{k})| = 0$ must be satisfied. The last case is that of "polarization waves". All three, the longitudinal, the fictitive longitudinal, and the polarization waves satisfy the condition div $\vec{D}' = 0$. Finally the authors discuss some problems of the quantum theory of the dispersion of light in crystals during which the choice of the method of quantum-mechanically calculating the tensor $\varepsilon_{ij}(\omega,\vec{k})$ is also discussed. Taking into consideration the translational symmetry of the crystal a result is obtained for the current

density in the approximation of the perturbation theory. This result is:

$$j_i^{(n)}(k, \omega) = \sum_b \sigma_{ij}^{(n), b}(\omega, k) E_j(k + 2\pi b, \omega), \qquad (4,4)$$

where

$$\sigma_{ij}^{(n)}(\omega, k) = \sigma_{ij}^{(n), b=0}(\omega, k) = \sum_a \frac{ie_a^2}{m_a \omega} \delta_{ij} -$$

$$- \sum_{\alpha, \beta, m} \frac{ie_\alpha e_\beta}{4m_\alpha m_\beta \hbar \omega} \left\{ \frac{(\rho_i^\alpha e^{-ikr_\alpha} + e^{-ikr_\alpha} \rho_i^\alpha)_{mn} (\rho_j^\beta e^{ikr_\beta} + e^{ikr_\beta} \rho_j^\beta)_{nm}}{\omega - \omega_m + \omega_n} - \right.$$

$$\left. - \frac{(\rho_i^\alpha e^{-ikr_\alpha} + e^{-ikr_\alpha} \rho_i^\alpha)_{nm} (\rho_j^\beta e^{ikr_\beta} + e^{ikr_\beta} \rho_j^\beta)_{mn}}{\omega - \omega_m + \omega_n} \right\}. \qquad (4,5)$$

It may be assumed that the value of $\varepsilon_{ij}(\omega, \vec{k})$ is determined by exciton transitions, i. e., the frequencies ω_m and ω_n in (4.5) are the frequencies of "mechanical excitons" in the crystal. The exciton states are quasi-stationary, i. e. the ω_m are complex. One can expand (4.5) or the tensor σ_{ij}^{-1} into a series of powers of $\vec{k}$ and thus obtains formulas analogous to

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(2.9); in the neighborhood of the absorption line (4.8) holds. The investigations showed that the tensor $\varepsilon_{ij}(\omega,\vec{k})$ determines all properties of the "normal" electromagnetic waves in a crystal if $(a/\lambda_0)^2$ is sufficiently small. These waves are identical with the long wave excitations in the crystals, namely those which are treated by considering the electromagnetic interaction in the exciton theory. Therefore, crystal optics contains a part of general exciton theory if the spatial dispersion is taken into account. S. I. Pekar is mentioned. There are 30 references: 22 Soviet-bloc and 8 non-Soviet-bloc. The three most important references to English-language publications read as follows: T. Muto. Progr. Theor. Phys. Suppl., no. 12, 3, 1959; U. Fano. Phys. Rev. 103, 1202, 1956; J. J. Hopfield. Phys. Rev. 112, 1555, 1958.

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GINZBURG, V.L.; RUKHADZE, A.A.; SILIN, V.P.

Correction to the article "Electrodynamics of crystals and exciton theory." Fiz. tver. tela 3 no.9:2890 S '61. (MIRA 14:9)
(Crystals--Electric properties)
(Excitons)

BAKANOV, S.P.; RUKHADZE, A.A.; SANDOMIRSKIY, V.B.

Theory of the expansion of a gas bubble in a viscous liquid.
Inzh.fiz.zhur. 4 no.7:109-112 Jl '61. (MIRA 14:8)

1. Institut fizicheskoy khimii AN SSSR, Moskva.
(Bubbles)

RUKHADZE, A.A.; SILIN, V.P.

Energy loss in fast nonrelativistic electrons in metals.
Fiz. met. i metalloved. 12 no.2:287-289 Ag '61. (MIRA 14:9)
(Electrons) (Metals--Electric properties)

10.8000
26.2321

S/051/61/011/005/034/020
B104/B205

AUTHORS: Grebenshchikov, S. Ye., Rayzer, M. D., Rukhadze, A. A., and Frank, A. G.

TITLE: Reflection and refraction of shock waves in magnetohydrodynamics

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 31, no. 5, 1961, 529-536

TEXT: The authors studied the reflection and refraction of converging ring-type shock waves by a cylindrical "magnetic wall". As the front width of the shock waves was much smaller than the radial dimensions of the magnetic wall, the experimental results could be interpreted theoretically in terms of the interaction of a plane shock wave with the magnetic wall. The experimental arrangement is schematically shown in Fig. 1. The shock wave was produced electrodynamically in a 360-kc gas discharge. Two parallel-connected 0.2-μf capacitors were used as a power source. Two copper coils surrounding a vacuum chamber had an inductance of 0.57 μh. A cylindrical magnetic wall was produced by means of a quasi-static magnetic field ($\dot{H} = 2.5$ kc/sec) which had been generated by the discharge

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of two parallel-connected 150-μf capacitors through two coils (also connected in parallel) with a total inductance of 13.2 μh. The distributions of the magnetic fields are graphically represented in Fig. 2. In a detailed theoretical discussion, the authors derive the following set of equations for the velocities of reflected and refracted shock waves:

$$\left.\begin{aligned} &\alpha+\beta(\alpha-x)(\alpha-z)=h+yz,\\ &\frac{y\alpha+\eta}{\alpha-x}+\frac{\beta}{2}[(\gamma-1)\alpha-(\gamma+1)z+2x]=0,\\ &\eta+h\frac{2y-\gamma z}{y-z}=\frac{y}{2}[2y-(\gamma+1)z]. \end{aligned}\right\} \qquad (16)$$

in the dimensionless parameters

$$\left.\begin{aligned} &x=\frac{u_1}{u_0},\quad y=\frac{u_2}{u_0},\quad z=\frac{v}{u_0},\\ &\eta=\frac{1}{M_0^2},\quad h=\frac{H_{z0}^2}{8\pi\rho_0 u_0^2},\quad \beta=\frac{\rho_1}{\rho_0}=\frac{\gamma+1}{\gamma-1+2\eta},\quad \alpha=\frac{v_1}{u_0}=\frac{2(1-\eta)}{\gamma+1}. \end{aligned}\right\} \qquad (15)$$

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Here, the usual symbols ρ, p, and v with the index o refer to a gaseous state that exists without the magnetic field of the shock wave. The index 1 refers to quantities behind the shock wave (Fig. 6). u_1 and u_2 are the velocities of the refracted and reflected shock waves, respectively; v is the velocity of the gas between these waves. Next, approximate solutions are derived for two limiting cases, i.e., for very weak and very strong magnetic fields. The solutions

$$\left.\begin{aligned} u_1 &= v_1 - c_1, \\ u_2 &\simeq u_0, \\ v &\simeq v_1. \end{aligned}\right\} \qquad (17)$$

and

$$\left.\begin{aligned} u_1 &= -u_0 \frac{2(\gamma-1)}{(\gamma+1)}, \\ u_2^2 &= c_0^2 + \frac{H_2^2}{4\pi\rho_0}, \\ v &\simeq 0 \end{aligned}\right\} \qquad (18)$$

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are obtained. Summing up: On the strength of experimental results, it was possible to neglect the ionization energy as compared to the kinetic energy of the gas, since the former amounts to less than one-tenth of the kinetic energy at velocities $u \geqslant 2 \cdot 10^6$ cm/sec. It is shown that the reflection of a shock wave from the magnetic wall is determined essentially by the parameter $h = H^2/8\pi\rho_0 u_0^2$ which expresses the ratio of the density of magnetic energy to the density of kinetic energy in the shock wave. The experimental conditions showed that the velocity u_0 of the incoming wave and the gas pressure p_0 are interrelated by $u_0 \sim 1/\sqrt{p_0}$. This velocity decreases as the molecular weight of the gas increases. In the present case, the quantity $\rho_0 u_0^2$ again depends neither on the type of gas nor on pressure. Thus, h is determined only by the strength of the magnetic field at the point of reflection, even in discharges in different gases and at different pressures. Consequently, the reflection of shock waves must be equal with equal fields. The calculated values are determined chiefly by $\gamma = c_p/c_v$. Thus, different maximum velocities u_1 of reflected

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waves are obtained for different values of γ and also different values of h at which maximum velocities are attained. For $\gamma = 5/3$, e.g., one obtains $u_{1max} = -u_o/2$, $h_{max} \simeq 4.5$; for $\gamma = 7/5$, $u_{1max} = -u_o/3$ and $h_{max} \simeq 6.7$. For $\gamma = 5/3$ the experimental results agree well with the theoretical ones.

With a field of about $4 \cdot 10^3$ oe, the velocity of the reflected wave is half as high as that of the incoming wave. This corresponds to $h \sim 4$, which means that the gas behind the shock wave dissociates almost entirely. Good agreement with the experimental results is obtained even with weak magnetic fields (less than $2 \cdot 10^3$ oe, i.e., $h < 1$). An increase in the velocity of the shock waves passing through the magnetic field is obtained with all magnetic field strengths, which is in accordance with theory. Thus, the velocity of a refracted wave in a field of about $4 \cdot 10^3$ oe is three times as high as that of the incoming wave and becomes equal to the magnetosonic velocity. R. A. Latypov is thanked for help in experiments, and A. T. Matachun for calculations done with the "Ural" computer. There are 8 figures and 5 Soviet-bloc references.

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B104/B205

Reflection and...

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SUBMITTED: July 25, 1960

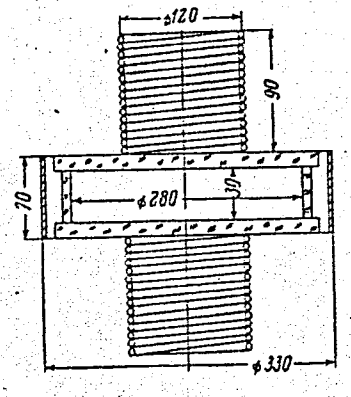

Fig. 1

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24, 2400 (1160, 1395, 1482)

AUTHORS: Kononov, B. P., Rukhadze, A. A., and Solodukhov, G. V.

TITLE: The electric field of an emitter in a plasma located in an external magnetic field

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 31, no. 5, 1961, 565-573

TEXT: A study has been made of the electric field in the neighborhood of an emitter in a plasma located in an external field. Measurements were done with the use of two antennas and a single h-f probe. The electric field of a point dipole can be described by

$$\mathbf{E} = -\frac{q}{2\pi^2}\int d\mathbf{k}\,\frac{\mathbf{k}\,(\mathbf{kd})\,e^{i\mathbf{kr}}}{k_i\varepsilon_{ij}(\omega)\,k_j}, \qquad (1)$$

where r is the radius vector of the observation point. Neglecting ion motion and particle collisions, the tensor $\varepsilon_{ij}(\omega)$ can be written as

$$\varepsilon_{ij}(\omega) = \begin{pmatrix} \varepsilon_1 & ig & 0 \\ -ig & \varepsilon_1 & 0 \\ 0 & 0 & \varepsilon_2 \end{pmatrix}, \qquad (2)$$

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