45582
S/103/63/024/002/001/020
D201/D308

AUTHORS: Popov, V.M. and Khalanay, A. (Bucharest)

TITLE: A problem of the theory of optimum systems with delay

PERIODICAL: Avtomatika i telemekhanika, v. 24, no. 2, 1963, 133-135

TEXT: The authors show that, given a system

$$\dot{x}(t) = A(t)x(t) + B(t)x(t - \tau) + H(t)u(t), \quad x(t) = \varphi(t), \quad t \in [-\tau, 0],$$

and the functional

$$I(u) = \int_0^\infty \{x^*(t)F(t)x(t) + x^*(t - \tau)G(t)x(t - \tau) + u^*(t)H(t)u(t)\}\, dt,$$

whose F, G, H are symmetrical matrices greater than or equal to zero, the optimum control u(t) has the unique solution $u(t) = -H^{-1}(t)H^*$

Card 1/2

ACCESSION NR: AP4033352 S/0103/64/025/003/0290/0301

AUTHOR: Khalanay, A. (Bucharest)

TITLE: Absolute stability of some nonlinear controlled systems with delays

SOURCE: Avtomatika i telemekhanika, v. 25, no. 3, 1964, 290-301

TOPIC TAGS: automatic control, nonlinear automatic control, automatic control stability

ABSTRACT: V. M. Popov's findings in the theory of nonlinear-plant stability have been successfully used in investigations of sampled-data systems and delay systems. The Popov method permits determining the conditions which ensure a definite asymptotic behavior of the solutions of nonlinear integral equations of this form:

$$\sigma(t) = s(t) + \int_0^t k(t-\alpha) f[\sigma(\alpha)]\, d\alpha.$$

Card 1/2

ACCESSION NR: AP4033352

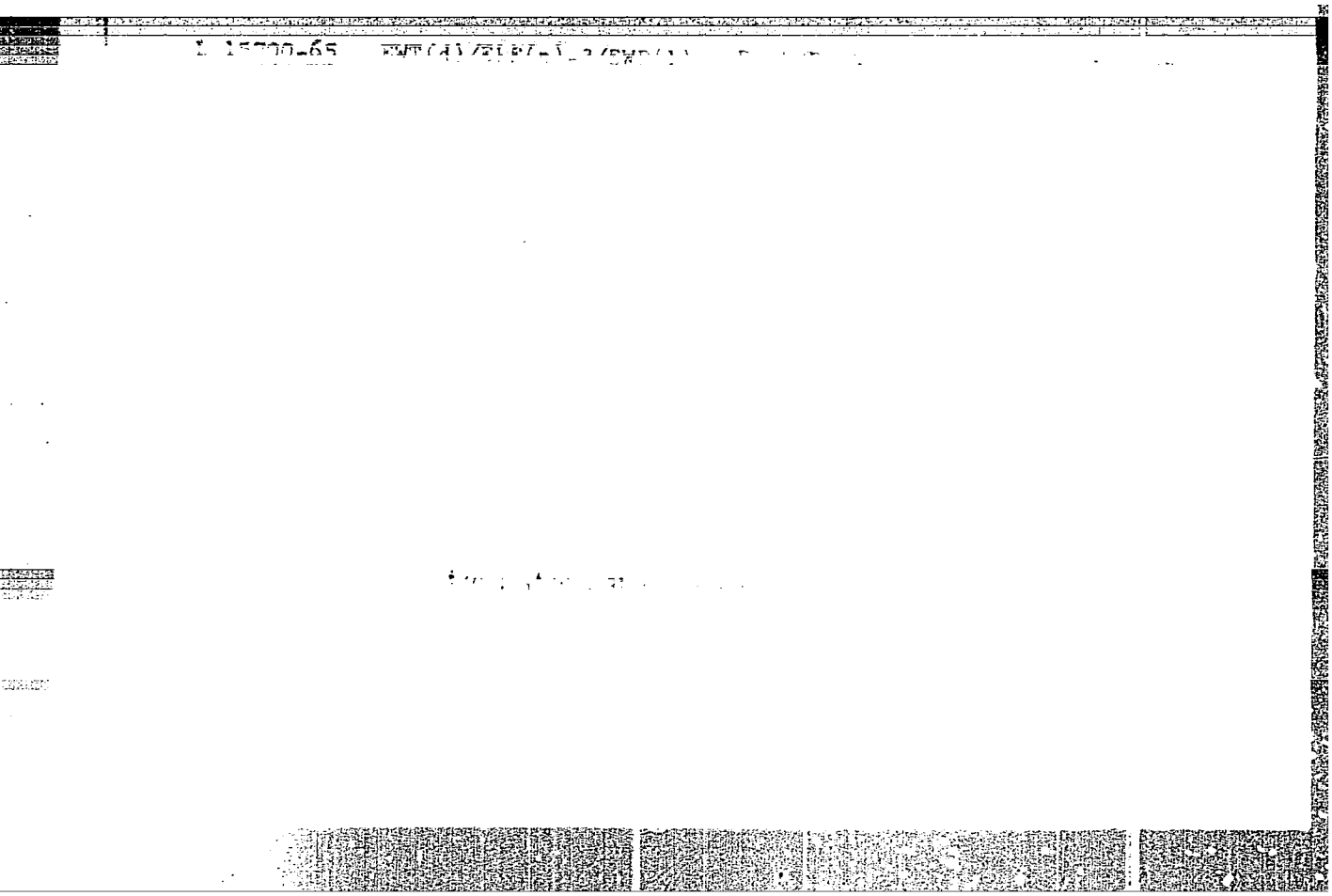
Seven particular cases of the stability of nonlinear delay systems are treated mathematically on the basis of Popov's method. Orig. art. has: 80 formulas.

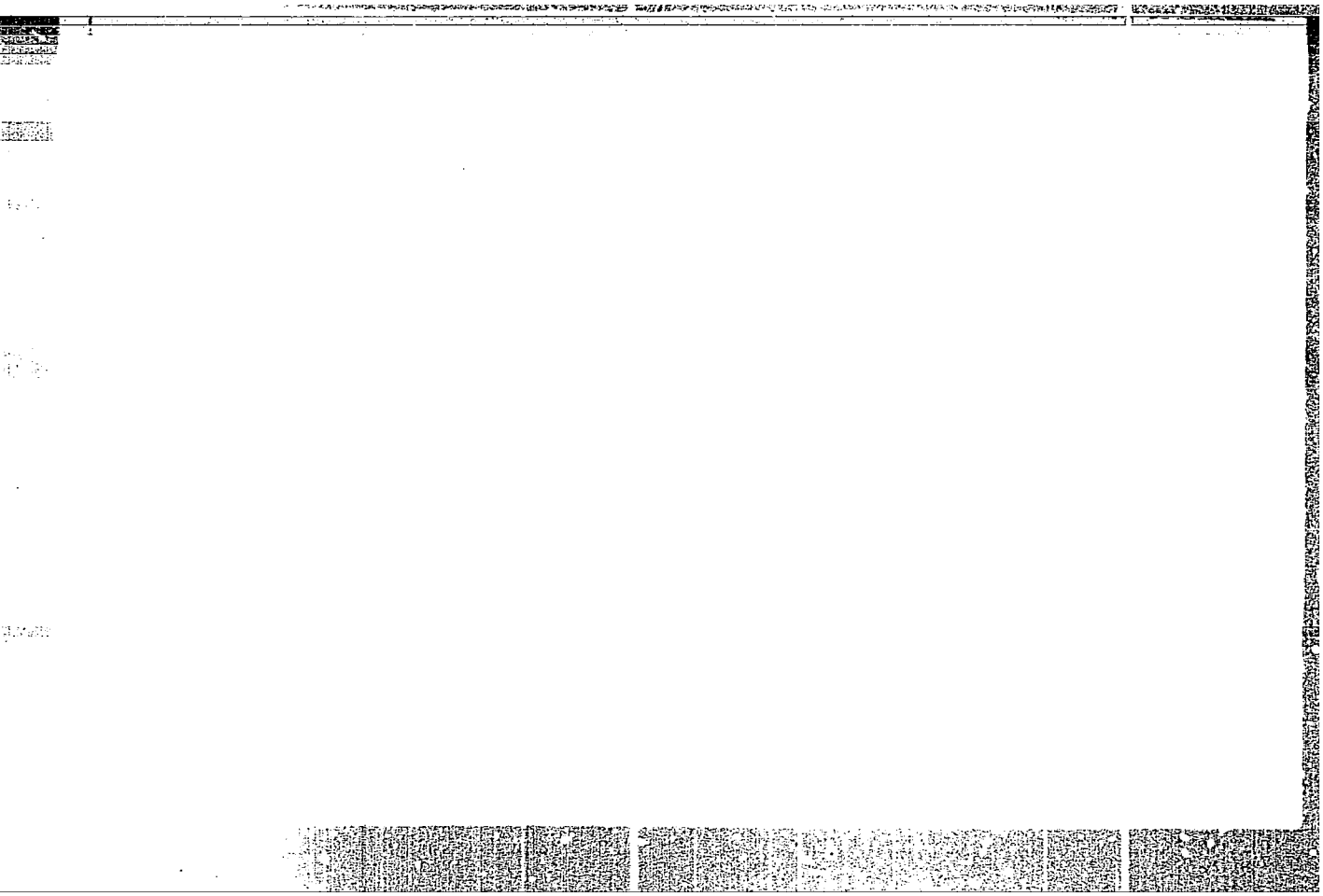
ASSOCIATION: none

SUBMITTED: 24Apr63 DATE ACQ: 15May64 ENCL: 00

SUB CODE: DP, IE NO REF SOV: 006 OTHER: 004

Card 2/2





APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000721710012-0"

KHALANAY, D.S.

Device for unloading pipes of large diameter. Rats. i izobr. predl. v stroi. no.89:10-11 '54. (MLRA 9:6)
(Pipe--Transportation) (Loading and unloading)

KHALANAY, D.S.

Device with self-wedging clamps for moving steel sheets.
Rats. i izobr. predl.v stroi. no.89:14-15 '54.(MLRA 9:6)
(Conveying machinery)

DUBROVIN, Ye.; KARMAL'SKIY, O.; FILATOV, G.; LOKOTKOV, A.; LEBEDINSKIY, A.; BARANOV, I.; MITSEVICH, P.; BABENKO, Ye.; GOLITSYN, A. (Ozery, Moskovskoy obl.); SHCHEPOTIN, I. (Ozery, Moskovskoy obl.); KHALANGOT, A. (Snezhnoye, donetskoy obl.); KUZ'MI[redacted] N. (Snezhnoye, Donetskoy obl.); SIRITSA, A., inzh. po ratsionalizatsii

This is the way we live. Izobr. i rats. no.10:4-5, 23 '63.
(MIRA 17:2)

1. Chlen soveta obshchestvennogo konstruktorskogo byuro zavoda im. V.I. Lenina (for Karmal'skiy). 2. Predsedatel' Amurskogo oblastnogo soveta Vsesoyuznogo obshchestva izobretateley i ratsionalizatorov (for Filatov). 3. Predsedatel' Chelyabinskogo promyshlennogo oblastnogo soveta Vsesoyuznogo obshchestva izobretateley i ratsionalizatorov (for Lokotkov). 4. Starshiy [redacted] Odesskogo zavoda imeni Dzerzhinskogo (for Lebedinskiy). 5. Predsedatel' zavodskogo soveta Vsesoyuznogo obshchestva izobretateley i ratsionalizatorov (for Baranov). 6. Predsedatel' soveta Vsesoyuznogo obshchestva izobretateley i ratsionalizatorov Irkutskogo zavoda tyazhelogo mashinostroyeniya imeni Kuybysheva (for Mitsevich).

S/122/62/000/002/003/007
D262/D301

AUTHOR: Khalangot, D.V., Engineer

TITLE: Selection of basic parameters for pneumatic plunger vibrators

PERIODICAL: Vestnik mashinostroyeniya, no. 2, 1962, 43-44

TEXT: The author attempts to find a general relation between air pressure in the pneumatic supply line, average vibration frequency, diameter, stroke, and weight of the plunger. The effective energy of compressed air in the cylinder of a two-way vibrator is given by Eq.(3)

$$E_e = 0,2p_s \frac{\pi D_p^2}{4} S_p \text{ Kgcm} \quad (3)$$

(D_p and S_p - plunger dia and travel respectively, P_e - mean effective pressure; the author states that it was found from experimental data that $p_e=0.1_{p_s}$, p_s being the supply line pressure. This equation is equivalent to Eq.(4)

$$E_e = \frac{m_p U_p^2}{2} \text{ Kgcm} \quad (4).$$

Card 1/2

Selection of basic ...

($m_p = \frac{G_p}{g}$ - mass of plunger, V_p - mean plunger velocity). The final result is given by Eq.(6) $77\ p_s D_p^2 = G_p S_p n_p^2$ (6), and if the housing of the vibrator is movable the final equation will be Eq.(13)

$$0{,}2\ p_s \frac{\pi D_p^2}{4}(S_p + S_h) = \frac{2G_p S_p^2 n_p^2}{g}\left(1 + \frac{G_p}{G_h}\right) \quad (13).$$

(n_p - number of double strokes of the plunger; G_h and S_h are plunger housing weight and travel respectively). Comparison of the theoretical and experimental results has shown that the error does not exceed 15%. There are 2 Soviet-bloc references.

Card 2/2

KAVAKHOV, A.B., tekhn.; KHALANSKOY, G.K., tekhn.; [illegible], L.A., tekhn.

Production of trunnion plate forgings for steel-pouring ladles. Mashinostroenie no.1:64 Ja-F '65. (MIRA 18:4)

KHALANGOT, G.V., gornyy inzh.

Using movable battery stulls in inclined seams. Ugol' Ukr. 4 no.8:40-41 Ag '60. (MIRA 13:9)
(Mine timbering)

KHALANGOT, G.V., kand.tekhn.nauk

Improving the methods of roof control in inclined seams. Ugol' 39 no.2:15-18 F '64. (MIRA 17:3)

1. Donetskiy nauchno-issledovatel'skiy ugol'nyy institut.

KHALANGOT, G.V., inzh.

Safety measures in roof control in walls of slope beds. Bezop.truda v prom. 5 no.3:3-4 Mr '61. (MIRA 14:3)

1. Donetskiy nauchno-issledovatel'skiy ugol'nyy institut.
(Mine roof bolting—Safety measures)

KOSHKINA, T.V.; KHALANSKIY, A.S.

Burrows and refuges of the Norwegian lemming (Lemmus lemmus).
Biul. MOIP. Otd. biol. 68 no.1:16-24 Ja-F '63. (MIRA 17:4)

KOSHKINA, T.V.; KHALANSKIY, A.S.

Mass multiplication of Norwegian lemmings in the southern part of the Kola Peninsula. Biul. MOIP, Otd. biol. 65 no. 4:112-114 Jl-Ag '60. (MIRA 13:10)

(KOLA PENINSULA--LEMMINGS)

KOSHKINA, T.V.; KHALANSKIY, A.S.

Age-related variations in the skull and an analysis of the age composition of populations of the Norwegian lemming (Lemmus lemmus). Biul. MOIP. Otd. biol. 66 no.2:3-14 Mr-Ap '61. (MIRA 14:6)
(KOLA PENINSULA—LEMMINGS) (SKULL)

KOSHKINA, T.V.; KHALANSKIY, A.S.

Reproduction of the lemming Lemmus lemmus L. on the Kola Peninsula.
Zool. zhur. 41 no.4:604-615 Ap '62. (MIRA 15:4)

1. Natural Reserve of Kandalaksha.
(Kola Peninsula--Lemmings)

11(0)

SOV/93-58-9-2/17

AUTHOR: Khalapov, G.A.

TITLE: Economic Gain From Reservoir Pressure Maintenance at the Akhtyrsko-Bugundyrskiy Oilfield (Ekonomicheskaya effektivnost' podderzhaniya plastovogo davleniya na Akhtyrsko-Bugundyrskom mestorozhdenii)

PERIODICAL: Neftyanoye khozyaystvo, 1958, 36 Nr 9, pp 10-13 (USSR)

ABSTRACT: The author disagrees with V.S. Klochko [Ref 1] concerning the unprofitability of pressure maintenance at the Akhtyrsko-Bugundyrskiy Oilfield. Data obtained by the Krasnodar Department of the VNIIneft' Institute show that the 18.1 million ruble loss, incurred by the PPD - tsekh podderzhaniya plastovogo davleniya (Pressure Maintenance Section) from 1953 through 1956, can be compensated for by 1960. But the author maintains that this can be achieved prior to 1960 if the 17 million rubles or 40 percent of the expenses with which the Pressure Maintenance Section was incorrectly charged by the Abinneft' NPU were excluded from the account. He points out that the Pressure

Card 1/2

11(0) SOV/93-58-9-2/17

Economic Gain from Reservoir (Cont.)

Maintenance Section is incorrectly charged for the gas and water injection wells which at the time of transfer are in such a poor state [Ref 3] that they can produce only 60,000 tons of petroleum, whereas when serving as injection wells they raise the general output of the oilfield by more than 285,000 tons [Ref 2]. He also points out that the pressure maintenance expenses can be reduced by employing AVaP centrifugal pumps, U8-3 pumps, and other facilities of no higher capacity than required for the injection process. The author concludes that it is very important to determine the economic gain from pressure maintenance at the Akhtyrsko-Bugurlynskiy Oilfield correctly since the increase in oil production in the Krasnodarskiy kray will largely depend on pressure maintenance operations. There are 3 Soviet references.

Card 2/2

KHALAPOV, G.A.

Method for calculating the cost of water or gas injection for the Akhtyrskoye-Bugundyr field. Trudy KF VNII no.2:151-160 '59. (MIRA 13:11)
(Akhtyrskoye-Bugundyr region--Oil field flooding--Costs)

KHALAPOV, G.A.

Method of calculating economic indices. Trudy KF VNII no.7: 109-131 '61. (MIRA 14:12)
(Oil fields—Production methods)

KHALAPOV, G.A.

Technical and economic analysis of the development of Akhtyrskoye-Bugundyr type oil pools. Trudy KF VNII no.7:132-138 '61. (MIRA 14:12)
(Akhtyrskoye-Bugundyr region--Oil fields--Production methods)

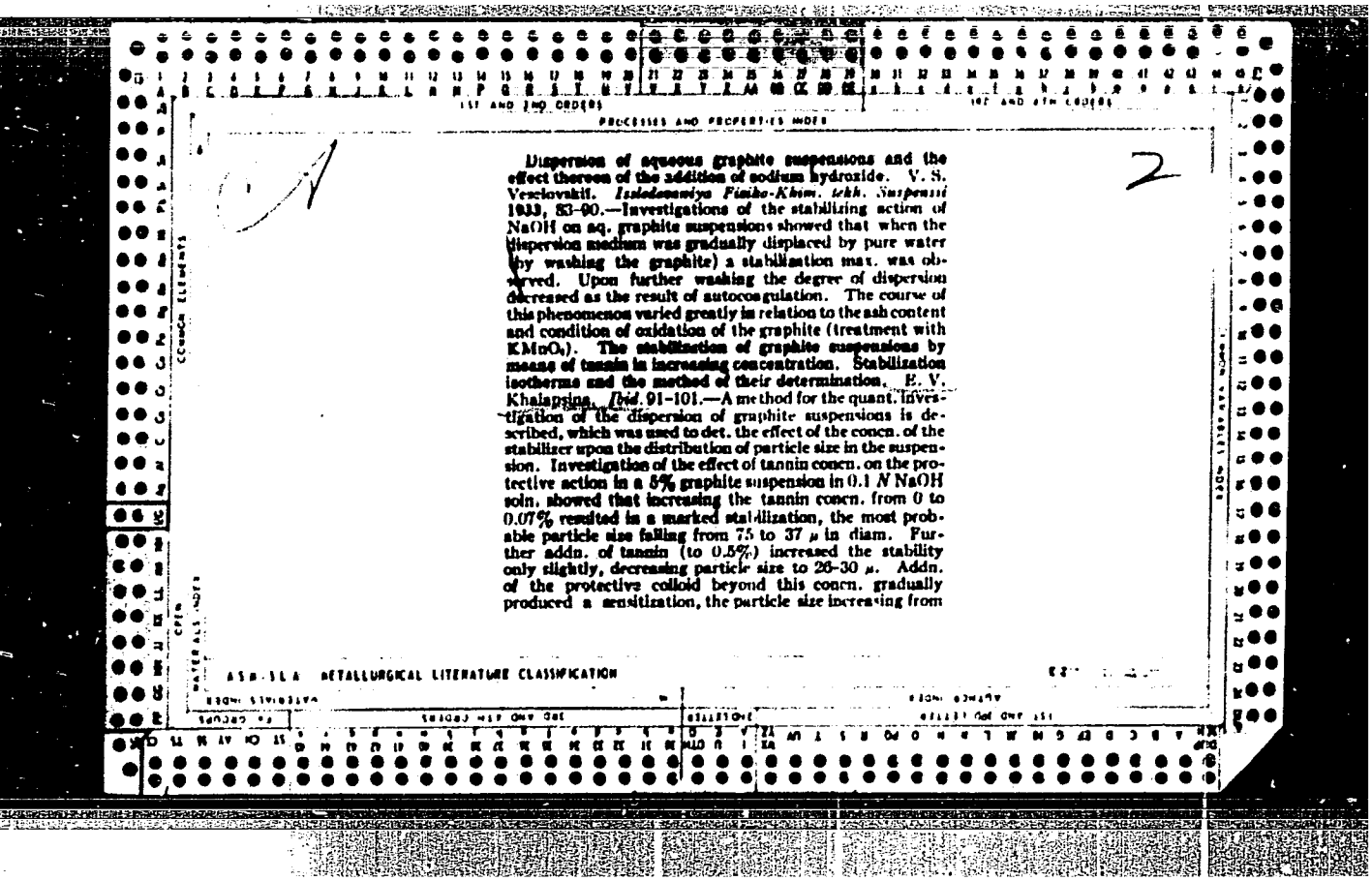
KHALAPOVA, A. Kh.

GUSEYNOV, R.N., dotsent; KHALAPOVA, A.Kh.; BAGIRBEKOVA, L.K.

Result of examining women cotton workers in rural areas of Azerbaijan. Akush.i gin. no.2:23-25 no.2:23-25 Mr-Ap '55. (MLRA 8:7)

1. Iz Azerbaydzhanskogo nauchno-issledovatel'skogo instituta okhrany materinstva i detstva (dir. K.Ya.Faradzheva).

(INDUSTRY AND OCCUPATIONS,
gyn. exam. of cotton workers)
(GYNECOLOGY,
gyn. exam. of cotton workers)

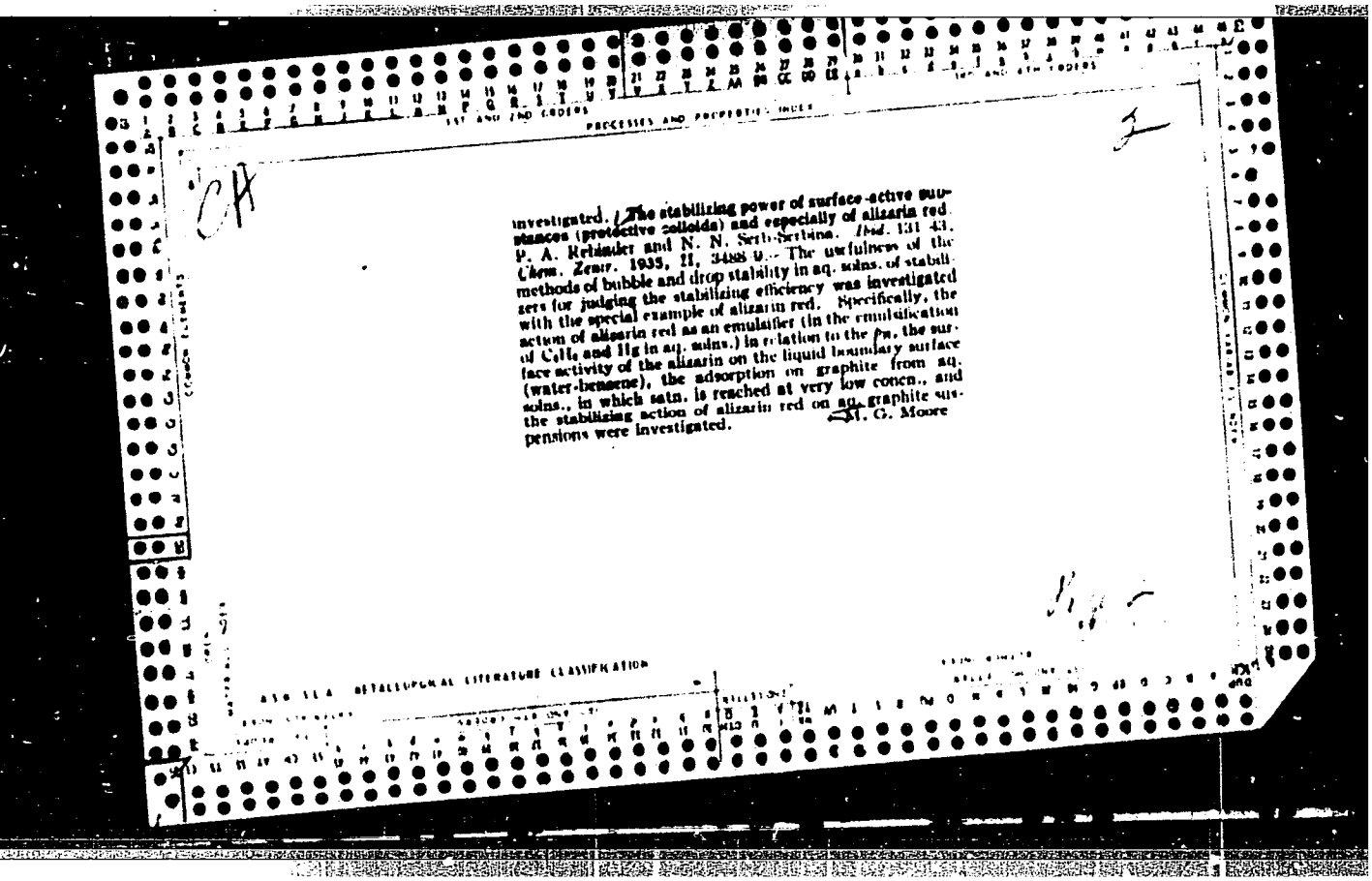


PROCESSES AND PROPERTIES INDEX

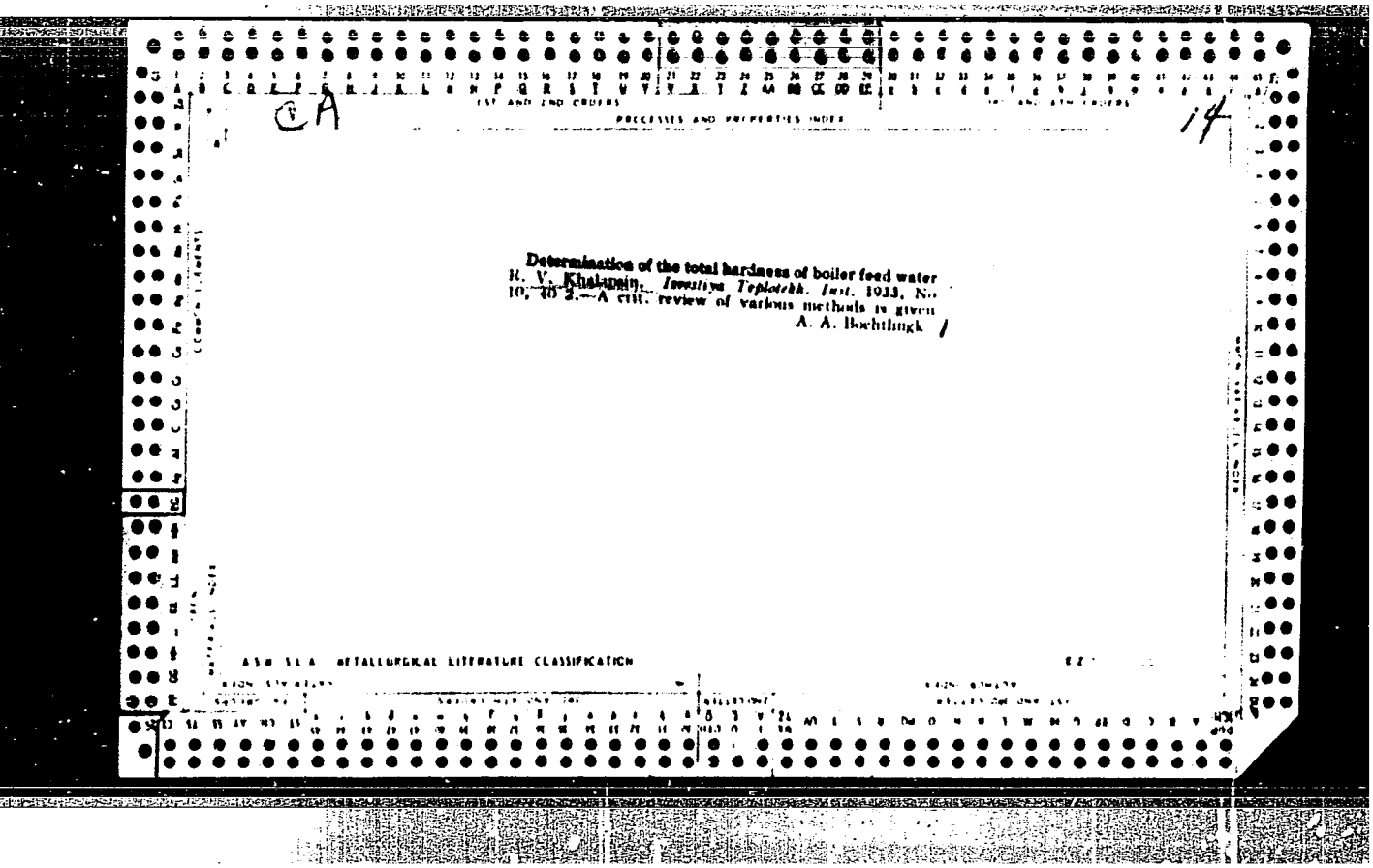
Dispersion of aqueous graphite suspensions and the effect thereon of the addition of sodium hydroxide. V. S. Veselovskii. *Issledovaniya Fiziko-Khim. tekh. Suspensii* 1933, 83-90.—Investigations of the stabilizing action of NaOH on aq. graphite suspensions showed that when the dispersion medium was gradually displaced by pure water (by washing the graphite) a stabilization max. was observed. Upon further washing the degree of dispersion decreased as the result of autocoagulation. The course of this phenomenon varied greatly in relation to the ash content and condition of oxidation of the graphite (treatment with $KMnO_4$). **The stabilization of graphite suspensions by means of tannin in increasing concentration. Stabilization isotherms and the method of their determination.** E. V. Khaiapsina. *Ibid.* 91-101.—A method for the quant. investigation of the dispersion of graphite suspensions is described, which was used to det. the effect of the concn. of the stabilizer upon the distribution of particle size in the suspension. Investigation of the effect of tannin concn. on the protective action in a 5% graphite suspension in 0.1 *N* NaOH soln. showed that increasing the tannin concn. from 0 to 0.07% resulted in a marked stabilization, the most probable particle size falling from 75 to 37 μ in diam. Further addn. of tannin (to 0.5%) increased the stability only slightly, decreasing particle size to 26-30 μ. Addn. of the protective colloid beyond this concn. gradually produced a sensitization, the particle size increasing from

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

36 to 30 μ. **Stabilization effect of tannin on suspensions of different kinds of graphite at different p_H values of the dispersion medium.** N. N. Serb-Serbina. *Ibid.* 102-16.—The stabilizability of Kure and Aliberow graphite suspensions in the oxidized and nonoxidized conditions was detd. by sedimentometric methods both in the absence of tannin and at const. tannin concns. (0.25-0.50%) and at various NaOH concns. of the dispersion medium (from 10^{-1} to 10^{-6} *N*). In the absence of tannin the greatest degree of dispersion was reached at a NaOH concn. of 10^{-4} *N*. In the case of oxidized (with chromic acid) Kure graphite, considerably greater stability (or degree of dispersion) was observed during washing than during the reverse process of adding NaOH. In the case of oxidized Aliberow graphite conditions were opposite, the dispersion being greater during the addn. of NaOH than at corresponding stages during the washing out of the alkali. A stabilizing effect was not observed with the nonoxidized graphite. **The stabilization of graphite suspensions in nonaqueous dispersion media (hydrocarbons) by polar substances.** E. K. Venstrom and E. M. Svereva. *Ibid.* 117-30.—The degree of dispersion of various graphite suspensions in nonpolar liquids (C_6H_6 and C_6H_4 mixts. with other hydrocarbons) was investigated in the presence of various polar, surface-active stabilizers (fatty acids, alcs., amines, phenols). In contrast to their behavior in aq. suspensions, all these simple surface-active substances acted as stabilizers in such nonpolar dispersion media. Traube's rule is useful in predicting the stabilizing power of the compds.



investigated. The stabilizing power of surface-active substances (protective colloids) and especially of alizarin red. P. A. Rehbinder and N. N. Serb-Serbina. *Ibid.* 131-43. *Chem. Zentr.* 1935, II, 3488.—The usefulness of the methods of bubble and drop stability in aq. solns. of stabilizers for judging the stabilizing efficiency was investigated with the special example of alizarin red. Specifically, the action of alizarin red as an emulsifier (in the emulsification of CaH_2 and Hg in aq. solns.) in relation to the p_H, the surface activity of the alizarin on the liquid boundary surface (water-benzene), the adsorption on graphite from aq. solns., in which satn. is reached at very low concn., and the stabilizing action of alizarin red on aq. graphite suspensions were investigated. M. G. Moore



CA

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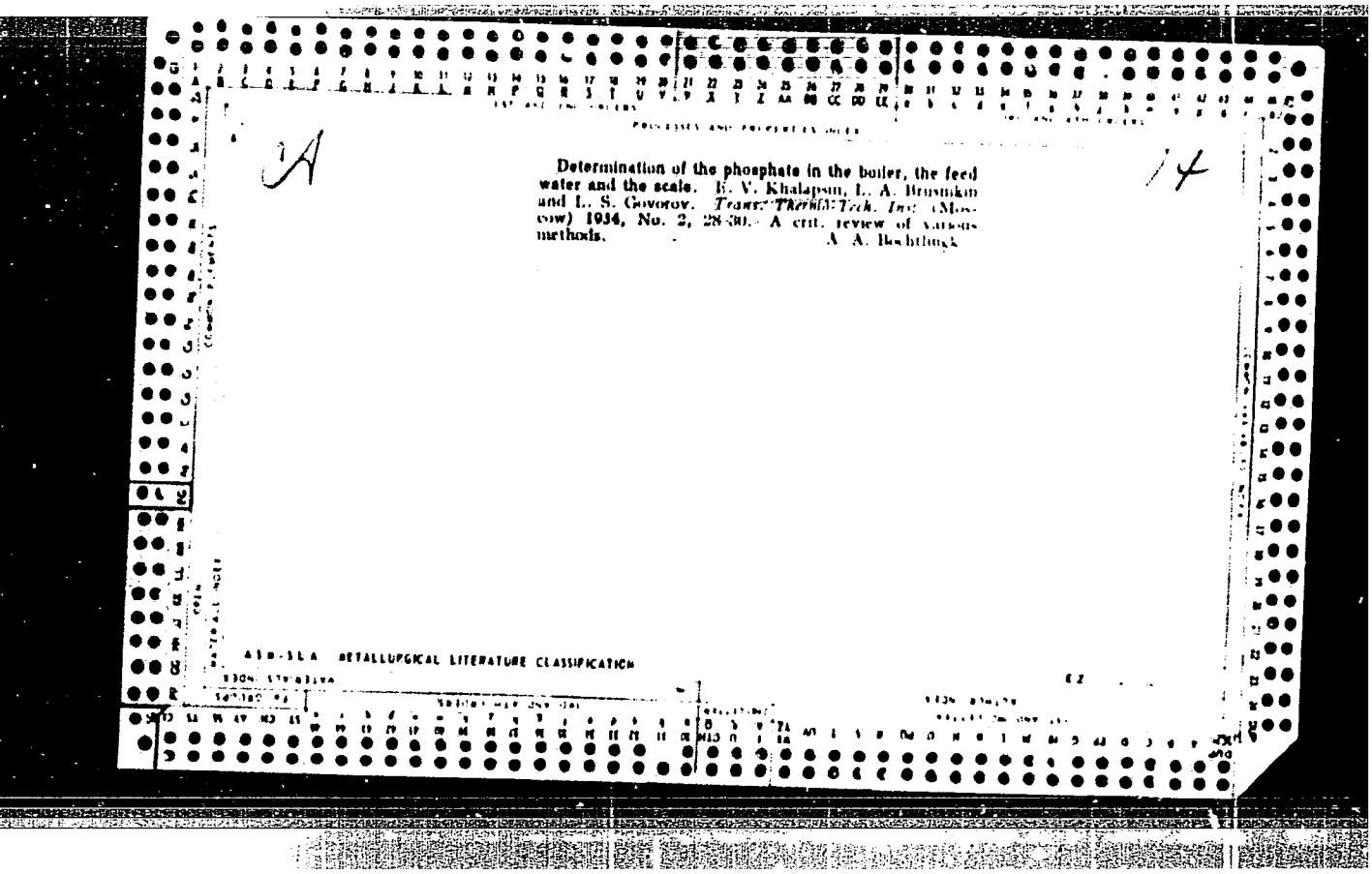
PROCESSES AND PROPERTIES INDEX

Determination of the total hardness of boiler feed water
R. V. Khalupin. *Izvestiya Teplotekh. Inst.* 1933, No. 10, 40 p.—A crit. review of various methods is given.
A. A. Boehtlingk

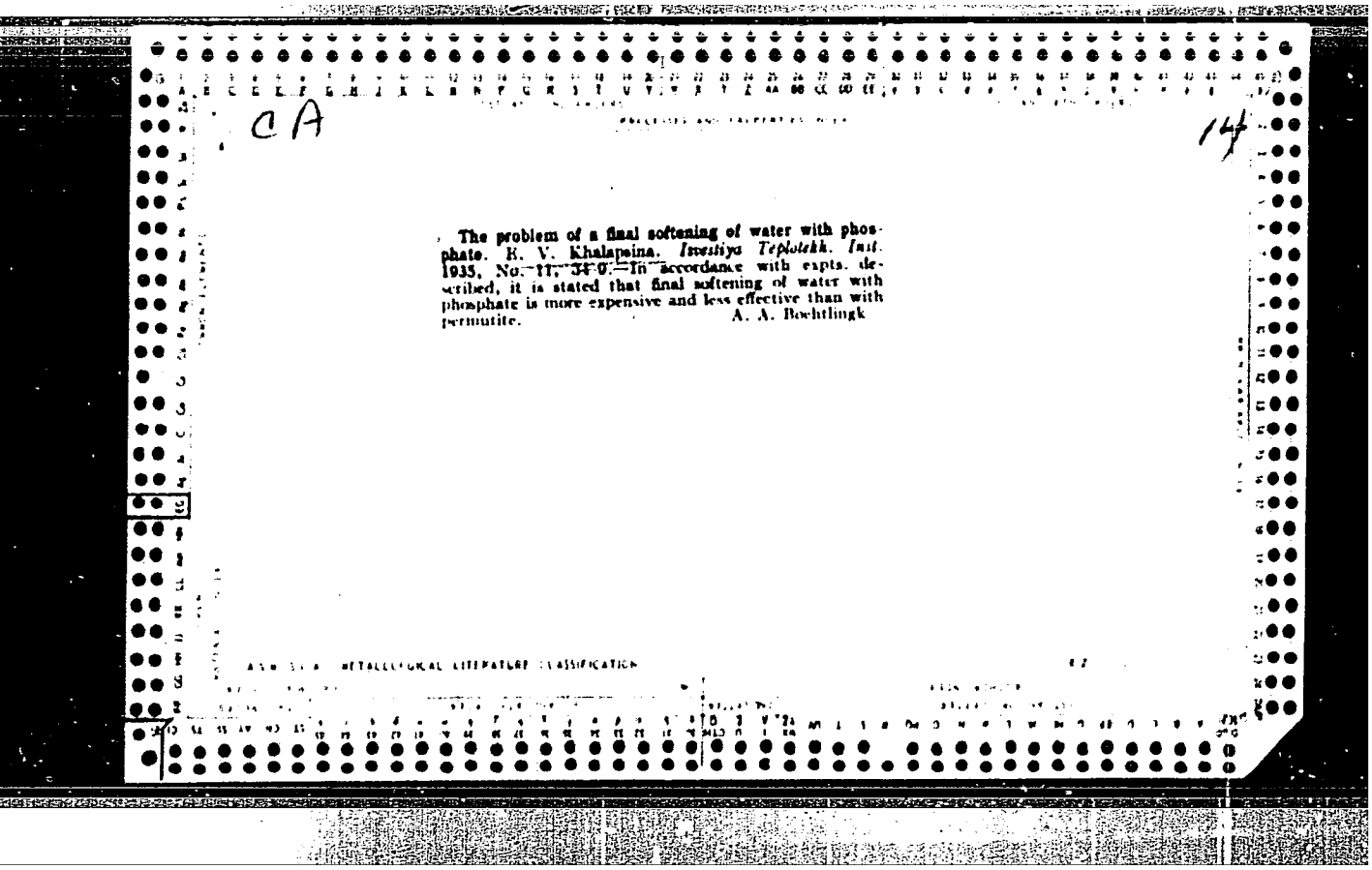
ASM SLA METALLURGICAL LITERATURE CLASSIFICATION



Determination of the phosphate in the boiler, the feed water and the scale. B. V. Khalapsin, L. A. Brusnikin and L. S. Govorov. *Trans. Thermal-Tech. Inst.* (Moscow) 1934, No. 2, 28-30. A crit. review of various methods.

A. A. Bashilova

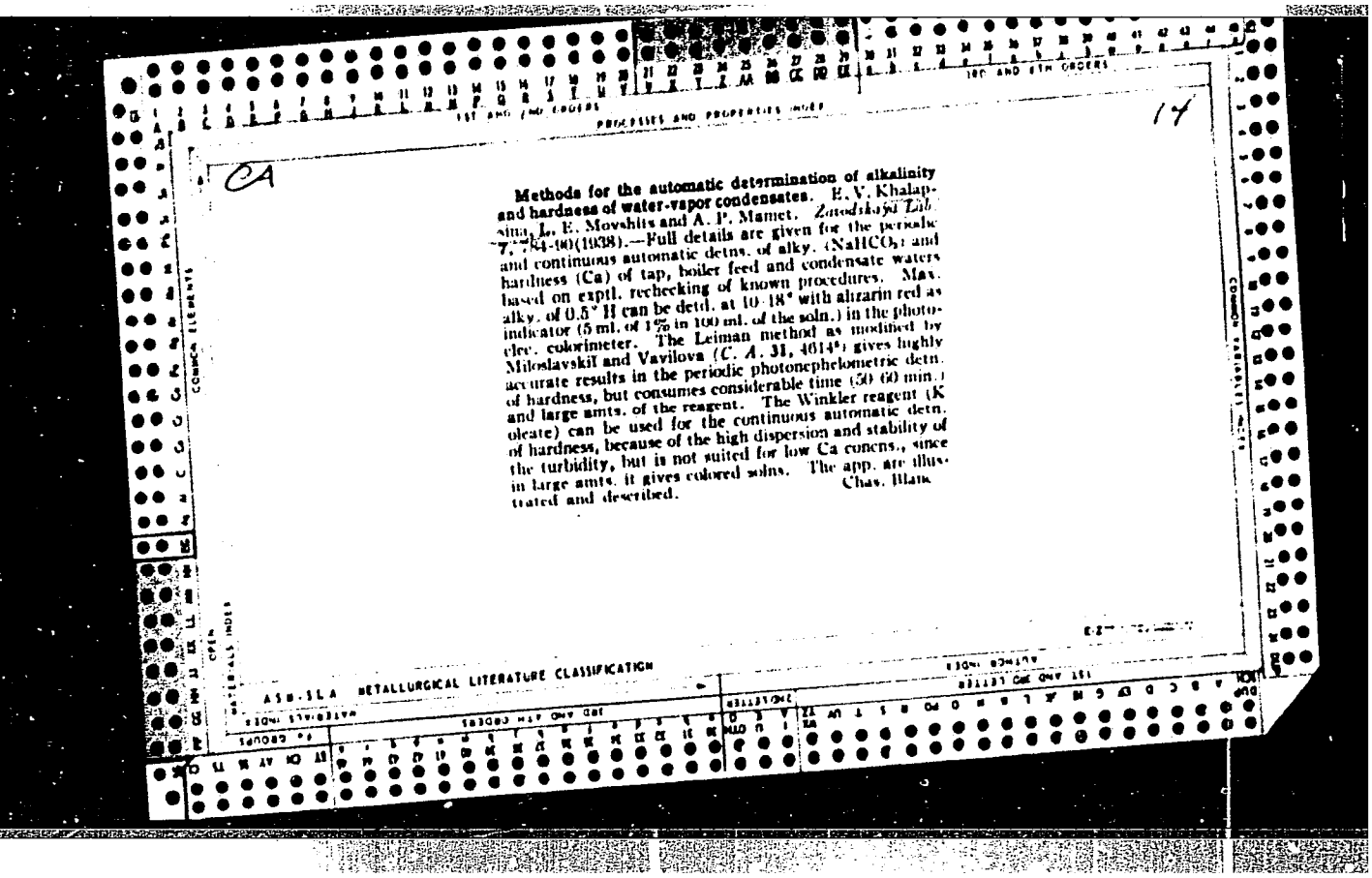
A1B-5L4 METALLURGICAL LITERATURE CLASSIFICATION



CA

14

The problem of a final softening of water with phosphate. K. V. Khalapsina. *Izvestiya Teplotekh. Inst.* 1935, No. 11, 34-9.—In accordance with expts. described, it is stated that final softening of water with phosphate is more expensive and less effective than with permutite. A. A. Boehtlingk



CA

Methods for the automatic determination of alkalinity and hardness of water-vapor condensates. E. V. Khalapsina, L. E. Movshits and A. P. Mamet. *Zavodskaya Lab.* 7, 784-90(1938).—Full details are given for the periodic and continuous automatic detns. of alky. ($NaHCO_3$) and hardness (Ca) of tap, boiler feed and condensate waters based on exptl. rechecking of known procedures. Max. alky. of 0.5° H can be detd. at 10-18° with alizarin red as indicator (5 ml. of 1% in 100 ml. of the soln.) in the photoelec. colorimeter. The Leiman method as modified by Miloslavskii and Vavilova (*C. A.* **31**, 4614°) gives highly accurate results in the periodic photonephelometric detn. of hardness, but consumes considerable time (50-60 min.) and large amts. of the reagent. The Winkler reagent (K oleate) can be used for the continuous automatic detn. of hardness, because of the high dispersion and stability of the turbidity, but is not suited for low Ca concns., since in large amts. it gives colored solns. The app. are illustrated and described.

Chas. Blanc

KHALAPSINA, YE. V.

Feed Water Purification

Bubbling in deaerators of feed water.
Elek. Sta., 23, No. 4, 1952.
Inzh. Tekhnicheskoye Upravleniye MES

Monthly List of Russian Accessions, Library of Congress, August, 1952. UNCLASSIFIED.

1. KOT, A.A.; KOTLYAR, R.V., ENG.; KHALAPSINA, YE.V., ENG.

2. USSR (600)

4. Steam Turbines

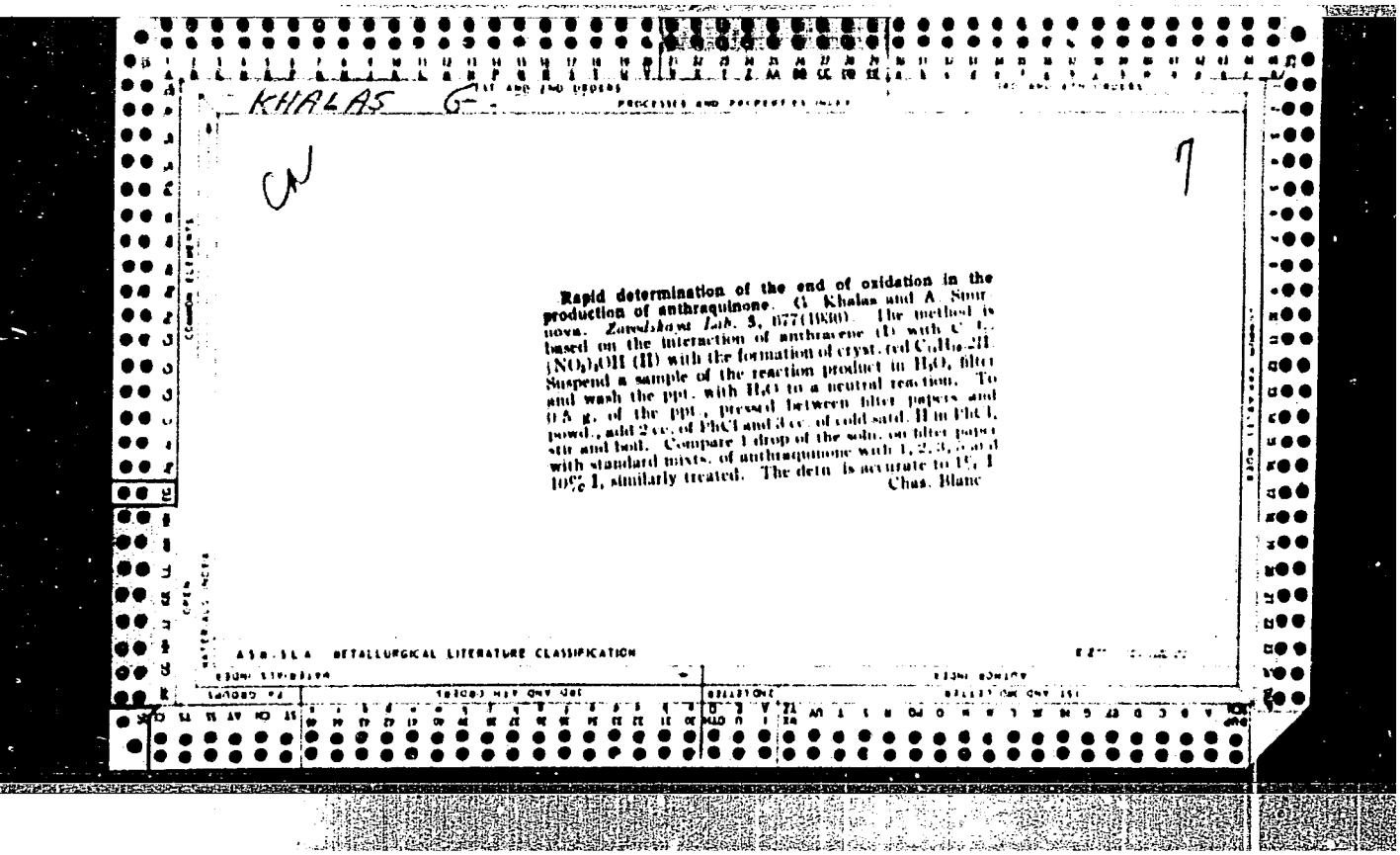
7. Preventing the clogging of turbines with salts. Elek.sta. 23 no.9, 1952.

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

KHALAPSINA, Ye.V., inzhener.

Aiding the student of the new "Rules of technical operation of electric power stations and networks." Chapter 16. Water regimen and chemical control of electric power plants. Energetik 2 no.5:32-36 My '54. (MLRA 7:6)

(Electric power stations)



KHALAS G-

W

7

Rapid determination of the end of oxidation in the production of anthraquinone. G. Khalas and A. Smirnova. *Zavodskaya Lab.* 5, 677(1936). The method is based on the interaction of anthracene (I) with $C_6H_{10}(NO_3)_2OH$ (II) with the formation of cryst. red $C_{14}H_{10}\cdot 2II$. Suspend a sample of the reaction product in H_2O, filter and wash the ppt. with H_2O to a neutral reaction. To 0.5 g. of the ppt., pressed between filter papers and powd., add 2 cc. of PhCl and 3 cc. of cold satd. II in PhCl, stir and boil. Compare 1 drop of the soln. on filter paper with standard mixts. of anthraquinone with 1, 2, 3, ... and 10% I, similarly treated. The detn. is accurate to 1% I.

Chas. Blanc

A58-11A METALLURGICAL LITERATURE CLASSIFICATION

KHALAS, O. (Budapesht)

Limit equilibrium of reinforced concrete plates. Izv.AN SSSR Otd. tekh.nauk no.8:42-54 Ag '56. (MLRA 9:9)
(Elastic plates and shells) (Concrete slabs)

KHALAS, Z.

Professional Schooling in the Textile Trade in Hungary. Leka Promishlenost (Light Industry), #2:42: Feb 55

GALANIN, K.F., kand. tekhn. nauk; SHEVKUN, N.T.; TENOV, Yu.A.; KHALASH, R., red.

[Optimum cutting conditions and the geometry of disk cutters of stonecutting machines] Optimal'nye reznimy resaniia i geometriia reztsov diskov kamnerezykh mashin. Kishinev, Kartia moldovenieske, 1964. 103 p. (MIRA 18:9)

1. KHALATIAN, O. I.

2. USSR (600)

4. Runoff

7. Some problems in organizing and increasing the accuracy of water supply work. Izv. AN SSSR. Otd. tekh. nauk. No. 8, 1952.

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

SIDORENKO, M. V.; ALEKSANDROV, A. V.; KHALATIN, N. I.

"Operation of the largest system of gas supply and its work during peak load periods (on the example of Moscow system of gas mains)."

Report to be submitted at the 9th Intl. Gas Conference , Hague, 1-4 Sept 1964.

Deceased

KHALATIN, N.V. [deceased]

Mineralogy and geochemistry of the terrigenous formation of the Lower Carboniferous in the southern part of the Kama-Kinel' Depression. Sov. geol. 4 no.8:127-137 Ag '61. (MIRA 16:7)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.
(Kama Valley—Geology, Stratigraphic)
(Kinel' Valley—Geology, Stratigraphic)

PETROV, Mikhail Filippovich; KHALATIN, S.A., red.; SVETLAYEVA, A.S., red. izd-va; LOBANKOVA, R.Ye., tekhn. red.

[Cedar forests and their utilization] Kedrovye lesa i ikh ispol'zovanie. Moskva, Goslesbumizdat, 1961. 129 p. (MIRA 14:9)
(Forest products) (Cedar)

BARMIN, S.F.; KONDRASHEV, V.A.; KHALATIN, V.I.

Cutting in on a gas line with the use of rubber balls. Gaz. prom. 4 no.7:49-50 Jl '59. (MIRA 12:10)
(Gas, Natural--Piplines)

BARMIN, S.F.; KONDRASHEV, V.A.; KHALATIN, V.I.

Emergency repair service of gas pipelines. Gaz. prom. 4 no.12:41-42 D '59. (MIRA 13:3)
(Gas pipes--Maintenance and repair)

KHALATIN, V.I., KONDRASHEV, V.A., BARMIN, S.F., MAGAZANIK, Ya. M.

Interconnecting gas mains. Gaz.prom. 5 no.2:40-41 F '60.
(Gas, Natural--Pipelines)

SIDORENKO, M.V.; KHALATIN, V.I.

Underground storage of gas for Moscow. Gaz.prom. 10 no.3:47-52 '65. (MIRA 18:5)

BARMIN, S.F.; KONDRASHEV, V.A.; KHALATIN, V.I.

Ball cocks on main pipelines. Gaz.prom. 5 no.9:40-43 S '60. (MIRA 13:9)

(Gas, Natural--Pipelines)

SIDORENKO, M. V.; ALEKSANDROV, A. V.; KHALATIN, V. I.

"Operation of the largest gas supply system and its functioning under peak loads."

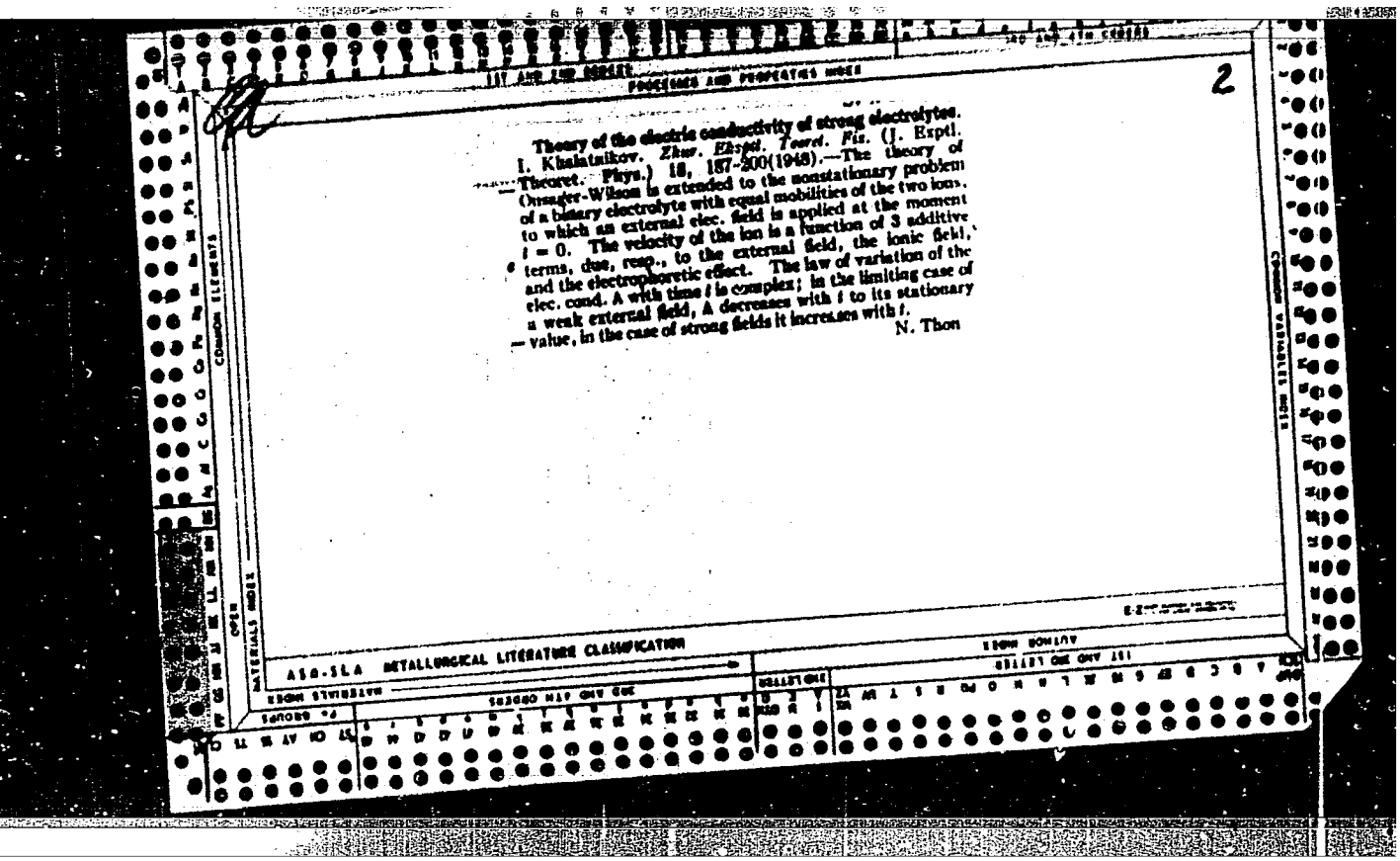
Report to be presented at the 9th Intl. Gas Conference, The Hague, 1-4 Sep 1964.

SIDORENKO, M.V.; ALEKSANDROV, A.V.; KHALATIN, V.I.

Operating a large gas-supply system. Gaz. prom. 9 no.8:5-10 '64.
(MIRA 17:9)

KHALATIN, V.N. [deceased]

Characteristics of facies of the lower Carboniferous formation in western Kinel'-Cherkassy District of the trans-Volga portion in Kuybyshev Province. Trudy Inst. geol. i razrab. gor. iskop. 1:226-239 '60. (MIRA 14:1)
(Kinel'-Cherkazzy District--Coal geology)



Theory of the electric conductivity of strong electrolytes. I. Khalatnikov. *Zhur. Eksptl. Teoret. Fiz.* (J. Exptl. Theoret. Phys.) 18, 187-200(1948).—The theory of Onsager-Wilson is extended to the nonstationary problem of a binary electrolyte with equal mobilities of the two ions, to which an external elec. field is applied at the moment $t = 0$. The velocity of the ion is a function of 3 additive terms, due, resp., to the external field, the ionic field, and the electrophoretic effect. The law of variation of the elec. cond. Λ with time t is complex; in the limiting case of a weak external field, Λ decreases with t to its stationary value, in the case of strong fields it increases with t.

N. Thon

2

A10-51A METALLURGICAL LITERATURE CLASSIFICATION

KHALATNIKOV, I. M.

M. Phys (2) 3

Nuclear Sci Abs, V-7 Nov 30, 1953 Physics

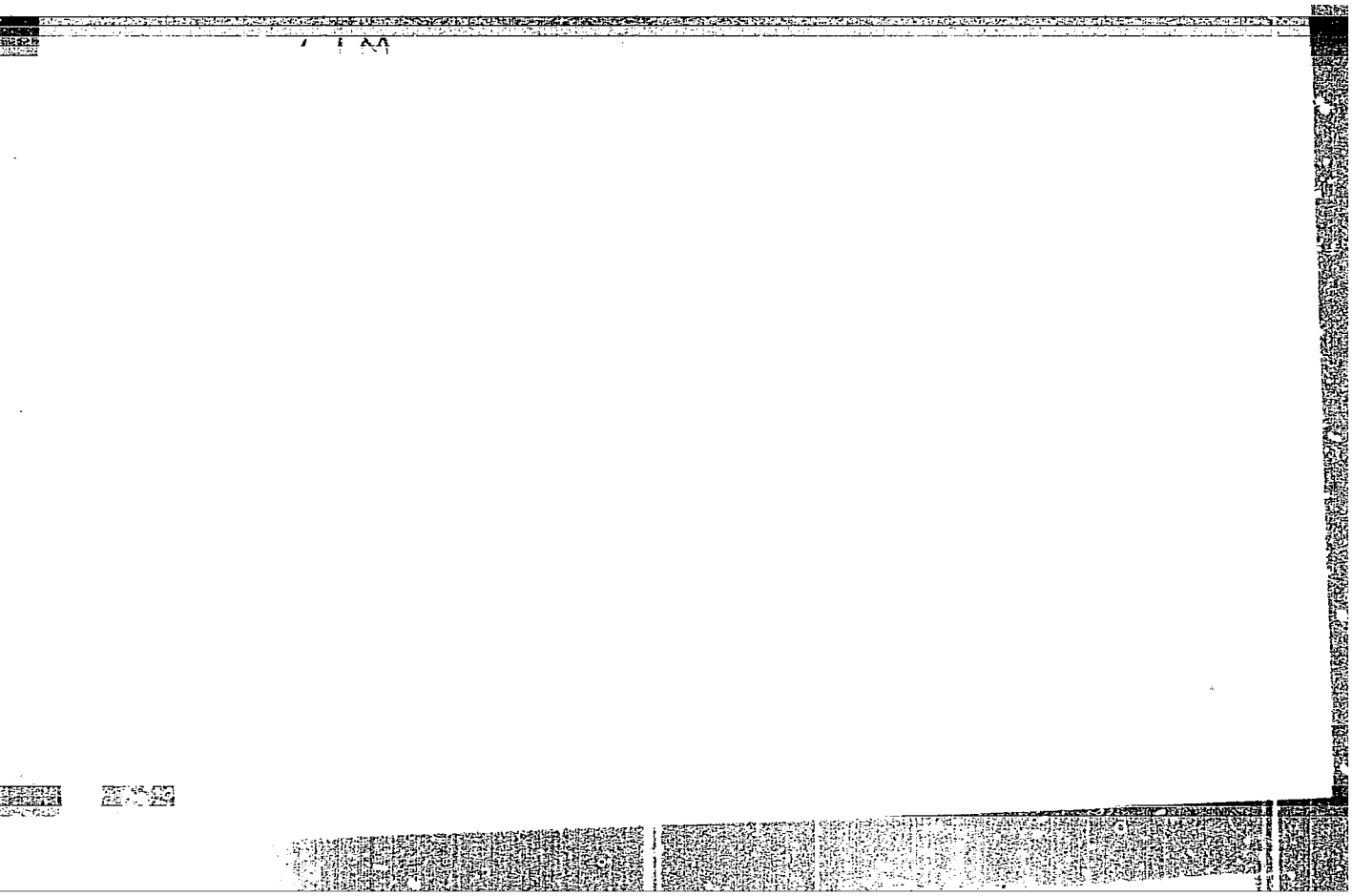
6+6+54 Rm2

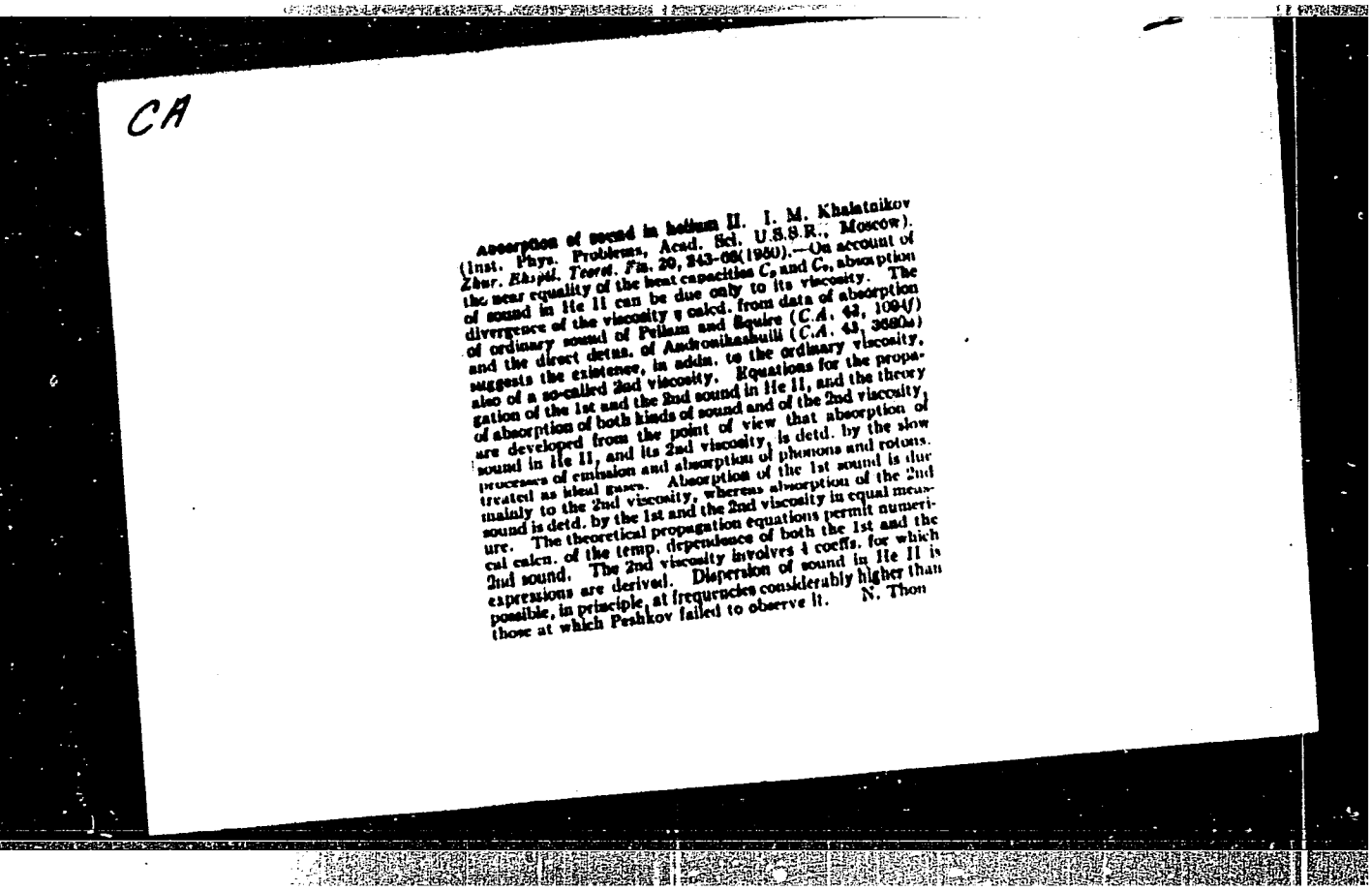
'THE THEORY OF THE VISCOSITY OF HELIUM II. 2. CALCULATION OF THE VISCOSITY COEFFICIENT. L. D. Landau and I. M. Khalatnikov. Translated from Zhur. Eksptl' i Teoret. Fiz. 19, 709-26(1949). 33p. (AEC-tr-1256)

The kinetic equations for rotons and phonons are solved by using effective differential cross sections for the scattering of elementary excitations (phonons and rotons) by each other, as obtained in the first part of this work. It is shown that the viscosity coefficient of He II is composed of two parts: one caused by scattering of rotons ("roton viscosity") and not dependent on temperature; the other caused by scattering of phonons ("phonon viscosity") and sharply increasing with fall in temperature. The experimental values for the viscosity coefficient in He II appear to be in good agreement with theory. (auth)

'THE THEORY OF THE VISCOSITY OF HELIUM II. I. COLLISIONS OF ELEMENTARY EXCITATIONS IN HELIUM II. L. D. Landau and I. M. Khalatnikov. Translated from Zhur. Eksptl' i Teoret. Fiz. 19, 637-50(1949). 23p. (AEC-tr-1256)

A theory describing the viscosity characteristics of He II is presented. This section deals principally with interaction and excitation considerations based on phonon and roton theory. (K.B.)





CA

Absorption of sound in helium II. I. M. Khalatnikov (Inst. Phys. Problems, Acad. Sci. U.S.S.R., Moscow). *Zhur. Eksptl. Teoret. Fiz.* 20, 243-68(1950).—On account of the near equality of the heat capacities C_p and C_v, absorption of sound in He II can be due only to its viscosity. The divergence of the viscosity η calcd. from data of absorption of ordinary sound of Pellam and Squire (*C.A.* 43, 1094*f*) and the direct detns. of Andronikashvili (*C.A.* 43, 3680*a*) suggests the existence, in addn. to the ordinary viscosity, also of a so-called 2nd viscosity. Equations for the propagation of the 1st and the 2nd sound in He II, and the theory of absorption of both kinds of sound and of the 2nd viscosity are developed from the point of view that absorption of sound in He II, and its 2nd viscosity, is detd. by the slow processes of emission and absorption of phonons and rotons, treated as ideal gases. Absorption of the 1st sound is due mainly to the 2nd viscosity, whereas absorption of the 2nd sound is detd. by the 1st and the 2nd viscosity in equal measure. The theoretical propagation equations permit numerical calcn. of the temp. dependence of both the 1st and the 2nd sound. The 2nd viscosity involves 4 coeffs. for which expressions are derived. Dispersion of sound in He II is possible, in principle, at frequencies considerably higher than those at which Peshkov failed to observe it. N. Thon

KHALATNIKOV, I. M.

~~KHALTNIKOV, I. M.~~

PA 174T51

USSR/Nuclear Physics - Dirac's Equation — Jan 51

"Radiational Corrections Added to Dirac's Equation (in Nonrelativistic Approximation)" A. A. Abrikosov, I. M. Khaltnikov, Inst Phys Problems, Acad Sci USSR

"Zhur Eksper i Teoret Fiz" Vol XXI, No 1, pp 69-78

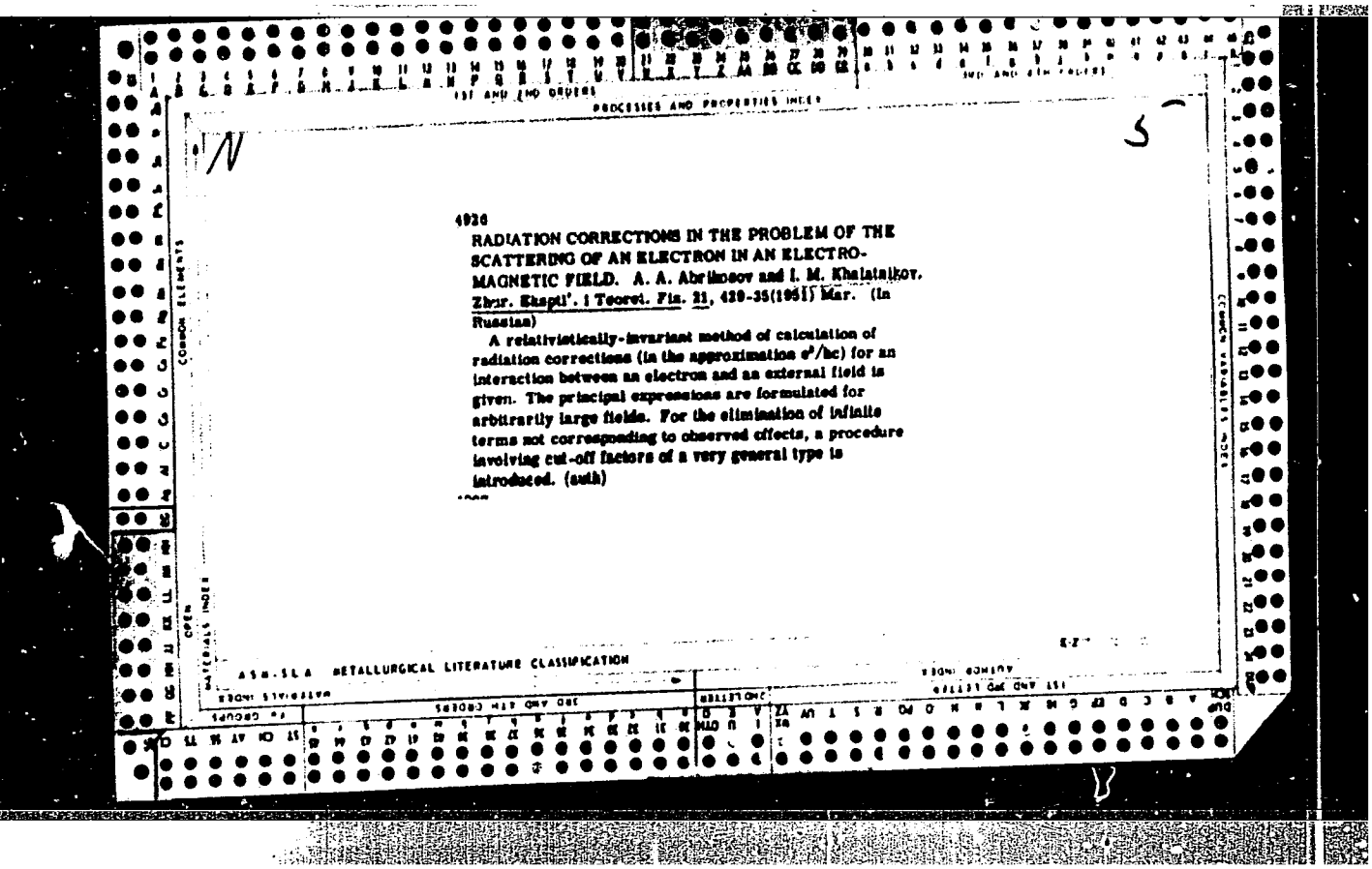
Calculates shift in energy levels of electron in external fld due to interaction with its own fld of radiation. Divergences appearing in the

174T51

USSR/Nuclear Physics - Dirac's Equation (Contd) — Jan 51

computations are eliminated by rejection of terms not depending upon external fld. This leads to considerable simplication and to great uniqueness in computations in comparison with results published earlier. In computations new method is used to obtain reduction relations. Submitted 16 Apr 50.

174T51



4936

RADIATION CORRECTIONS IN THE PROBLEM OF THE SCATTERING OF AN ELECTRON IN AN ELECTROMAGNETIC FIELD. A. A. Abrikosov and I. M. Khalatnikov. Zhur. Eksptl'. i Teoret. Fiz. 31, 429-35(1956) Mar. (In Russian)

A relativistically-invariant method of calculation of radiation corrections (in the approximation $e^2/\hbar c$) for an interaction between an electron and an external field is given. The principal expressions are formulated for arbitrarily large fields. For the elimination of infinite terms not corresponding to observed effects, a procedure involving cut-off factors of a very general type is introduced. (auth)

CA

Effective mass of He^3 and velocity of second sound in solutions of He^3 in He^4. I. M. Khalatnikov (S. I. Vavilov Inst. Phys. Problems, Acad. Sci. U.S.S.R., Moscow). *Doklady Akad. Nauk S.S.S.R.* 79, 57–9(1951); cf. preceding abstract.—The d. of the normal part of He II, ρ_n, is composed of ρ_{n3} of He^3 and ρ_{n4} of He^4. Depending on whether the momentum p_0 corresponding to the min. of energy is zero or different from zero, $\rho_{n3} = (\rho/m_3)x_3\mu$ or $\rho_{n3} = (\rho/m_3)x(p_0^2/3kT)$, resp., with m_3 = at. mass of He^3; the concn. $x = N_3m_3/(N_3m_3 + N_4m_4)$, where N_3 and N_4 are the nos. of He^3 and He^4 atoms in the soln.; μ = effective mass of He^3 in the dil. soln. in He^4. In the 2nd alternative, $\mu = p_0^2/3kT$, i.e. μ is dependent on the temp. Measurements of Lynton and Fairbank (*C.A.* 45, 2735b) of the velocity C_2 of 2nd sound in solns. of He^3 in He^4 permit, with the aid of Pomeranchuk's formula $C_2 = (\rho_n/\rho_n)\{[(S_0 + 3kx/m_3)^2T/(C_0 + 3kx/2m_3)] + (\partial Tx/m_3)\}$ (where $\rho_n = \rho - \rho_n$ = d. of the superfluid part, S_0 = entropy, C_0 = heat capacity of pure He^4 II), calcn. of ρ_{n3} and hence of μ. The result is $\mu = 8.5\ m_3$ (where m_3 = mass of the proton) with a scattering not exceeding 5%, independent of temp. Consequently, $p_0 = 0$ at the min. energy, i.e. the energy of the impurity is of the form $E = p^2/2\mu$. If p_0 were different from zero, μ would change by 35% between 1.25 and 1.7°K. The error of L. and F. in concluding that $p_0 \neq 0$ lies in their assumption that $\mu = 3$, i.e. equal to the at. mass of He^3, whereas actually μ is nearly 3 times as great. Knowledge of μ permits plotting of C_2 as a function of the temp. at different concns. and as a function of the concn. at different temps. The results are given in graphs. N. Thon

KHALATNIKOV, I. M.

USSR/Physics - Helium II 11 Jul 51

"Sound of Large Amplitude in Helium II," I. M. Khalatnikov, Inst of Phys Problems imeni Vavilov, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXXIX, No 2, pp 237-240

Considers the problem of the propagation of sonic oscillations in helium II in the 2d approximation. The 1st approximation is represented by the soln obtained from the linearized system of hydrodynamic eqs. Cf. Osborne and Temperley, Proc Phys Soc, 64, 1951. States that the 1st sound represents a wave of compression and rarefaction, and the 2d sound is a property characteristic only from helium

214T76

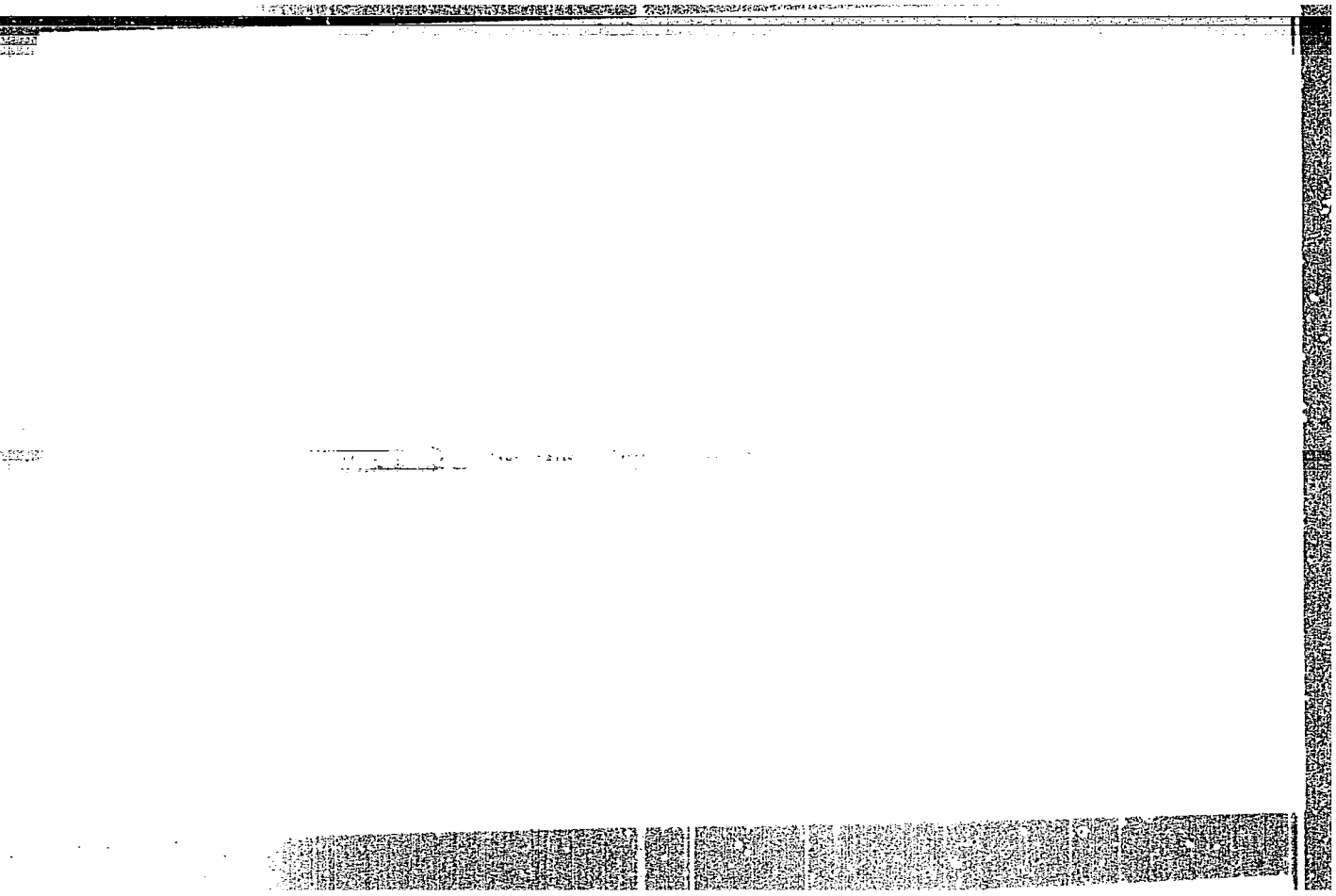
II and represents a temp wave. Submitted 14 May 51 by Acad L. D. Landau, who also gave an interesting discussion during the work.

214T76

KHALATNIKOV, I. M.

KHALATNIKOV, I. M. - "Investigations of the Theory on Superfluidity." Sub 17 May 52, Inst of Physical Problems imeni S. I. Vavilov, Acad Sci USSR. (Dissertation for the Degree of Doctor in Physicomathematical Sciences).

SO: Vechernaya Moskva January-December 1952



APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000721710012-0"

[redacted] substances. [redacted]

kinetic equation of the elementary excitation [redacted] clarify the question of its kinetic coefficients. This work [redacted]

KHALATNIKOV I.M.

USSR.

62

Thermal conductivity and absorption of sound in helium. I. M. Khalatnikov. *Zhur. Eksptl. i Teoret. Fiz.* 23, 21–34(1952); *Science Abstr.* 56A, 433(1953).—The coeff. of thermal cond. κ (cf. preceding abstr.) is calcd. explicitly as a function of temp. and in terms of the parameters Δ, p_0, and μ, specifying the excitation spectrum of He II. Because of the small thermal expansion of He II, κ does not enter into the absorption of 1st sound (thus leaving the formula of Khalatnikov (*C.A.* 45, 9961d) unchanged) but causes an absorption of 2nd sound larger than that previously calcd. (*loc. cit.*) due to viscous effects. By using more recent expt. data, new values of Δ, p_0, and μ are derived, and the absorption coeffs. of 1st and 2nd sound are calcd. numerically as functions of temp. (the results for 1st sound are not significantly different from those calcd. previously (*loc. cit.*)). It appears that for frequencies of order 10^8 cycles/sec. there should be an appreciable absorption of 2nd sound.

K. L. C.

KHALATNIKOV, I. M.

"Hydrodynamics of Solutions of Extraneous Particles in Helium II," Zhur Eksper i Teoret Fiz SSSR, 23, pp 169-181, 1952

DSIR
Translation

USSR/Physics - Helium II Sep 52

"Discontinuities and High-Amplitude Sound in Helium II," I. M. Khalatnikov, Inst of Phys Prcb-lems, Acad Sci USSR

"Zhur Eksper i Teoret Fiz" Vol 23, No 3, pp 253-264

Outlines conditions which should be fulfilled at the discontinuities of He II. Shows that only 2 kinds of discontinuities are possible in a super-fluid: pressure and temp discontinuities. Analyzes the propagation of high-amplitude sound in the superfluid. Author is indebted to Acad L. Landau. Received 7 May 52.

227T82

(PA 56 no. 668: 5445 '53)

KHALATNIKOV, I. M.

PA 227T83

USSR/Physics - Helium II — Sep 52

"Sound in Solutions of Foreign Particles in Helium II and the Dissipative Function of Solutions," I.M. Khalatnikov, Inst of Phys Problems, Acad Sci USSR

"Zhur Eksper i Teoret Fiz" Vol 23, No 3, pp 265-274

Eqs of hydrodynamics derived in a previous work (I. M. Khalatnikov, "Zhur Eksper i Teoret Fiz" 23, 169, 1952) in case of concd solns in He II are applied to the problem of sound propagation. General expressions detg velocities of 1st and 2nd sound in He II are derived. The form of the dissipative function of solutions is clarified. It is

shown that, besides the kinetic coeff of pure He II, a soln has 2 more coeffs, that of diffusion and that of thermodiffusion. Author is indebted to Acad L.D. Landau and Prof V.P. Peshkov. Received 7 May 52.

(PA Sb no. 668: S444 S3)

227T83

1. KHALATNIKOV, I

2. USSR (600)

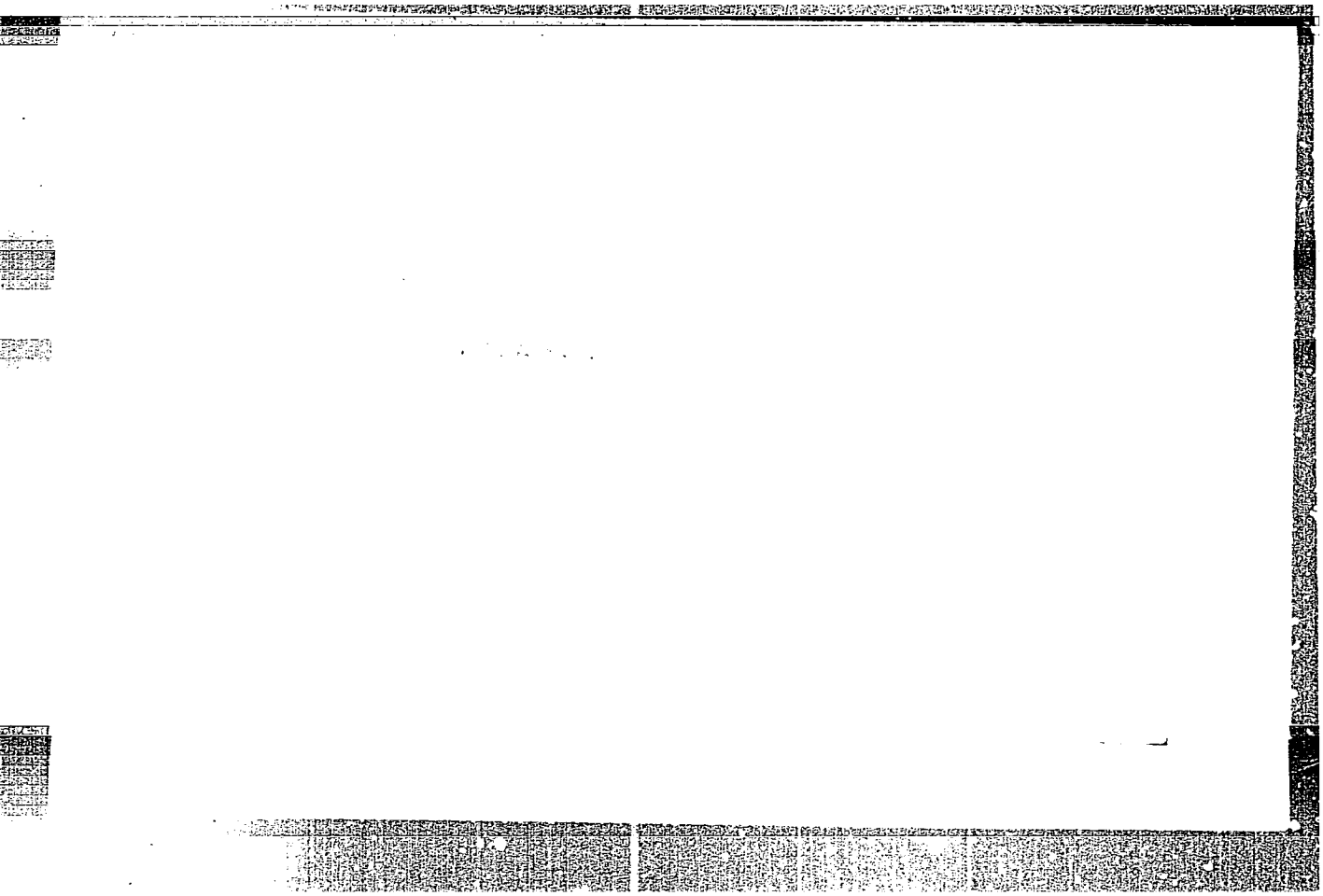
4. Statistical Mechanics

7. Method for the computation of a statistical sum. Dokl. AN SSSR, 87, No. 4, 1952

Analyzes R. Feynman's problem (Phy Rev 84,108 (1951)) of computing with exponential expressions contg non-commuting operators. Applies his method, which he considers simpler than the previous ones (see E. Wigner, Phy Rev 40 (1932); J. Kirkwood, ibid. 44, (1933)0, to computation of the statistical sum of systems characterized by Hamiltonian $H = \frac{p^2}{2m} + U(r)$. Indebted to Acad. L. D. Landau and A. A. Abrikosov. Presented by Acad. L. D. Landau 8 Oct 52.

255T115

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



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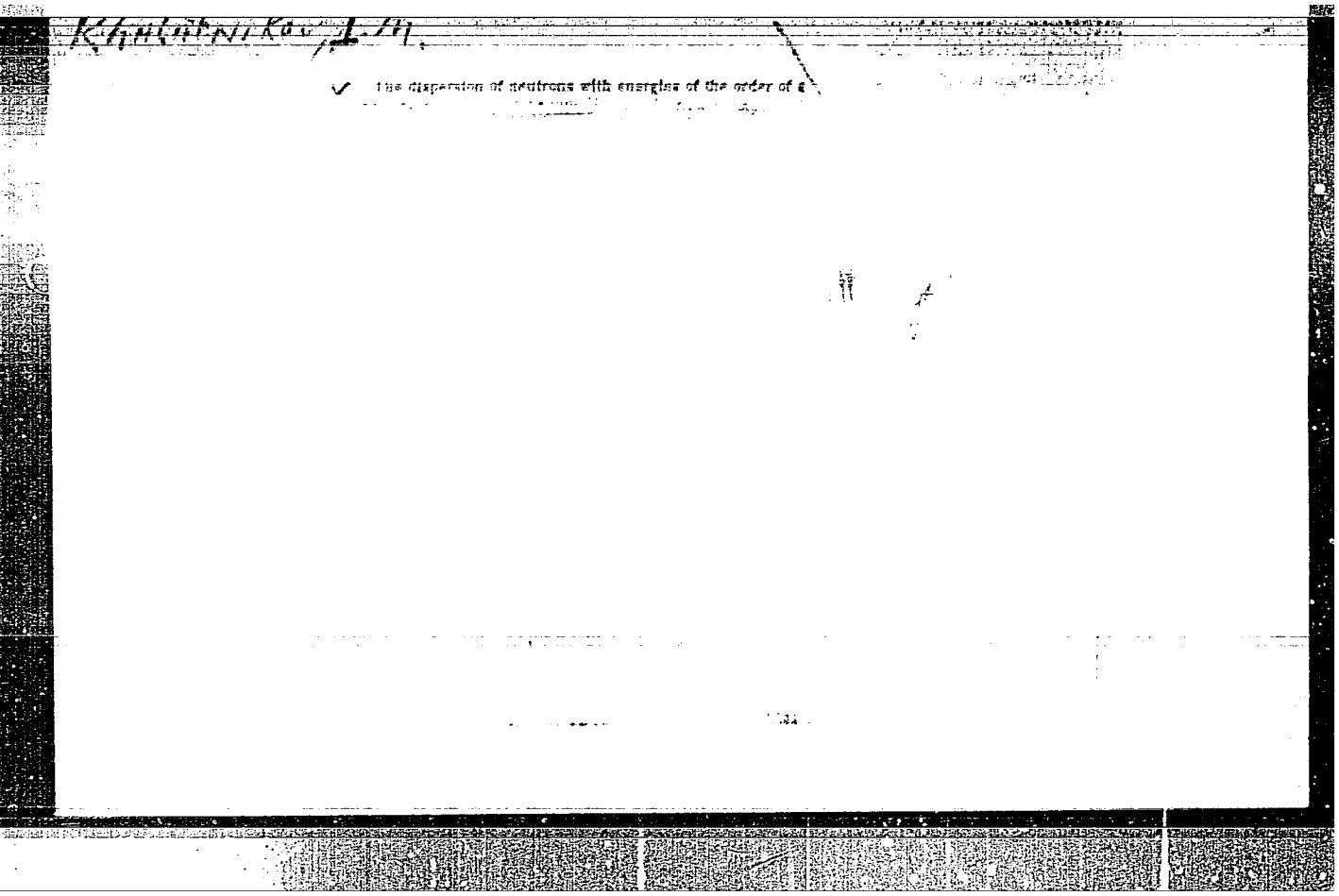
KHALATNIKOV, I.M.

[illegible] Stalin Prizes (of the Council of Ministers [illegible]) in the fields of science and inventions announces that the following scientific works, popular scientific books, and textbooks have been submitted for competition for Stalin Prizes for the years [illegible] and 1953. (Sovetskaya Kultura, Moscow, No. [illegible], [illegible] Feb - 3 Apr 1954)

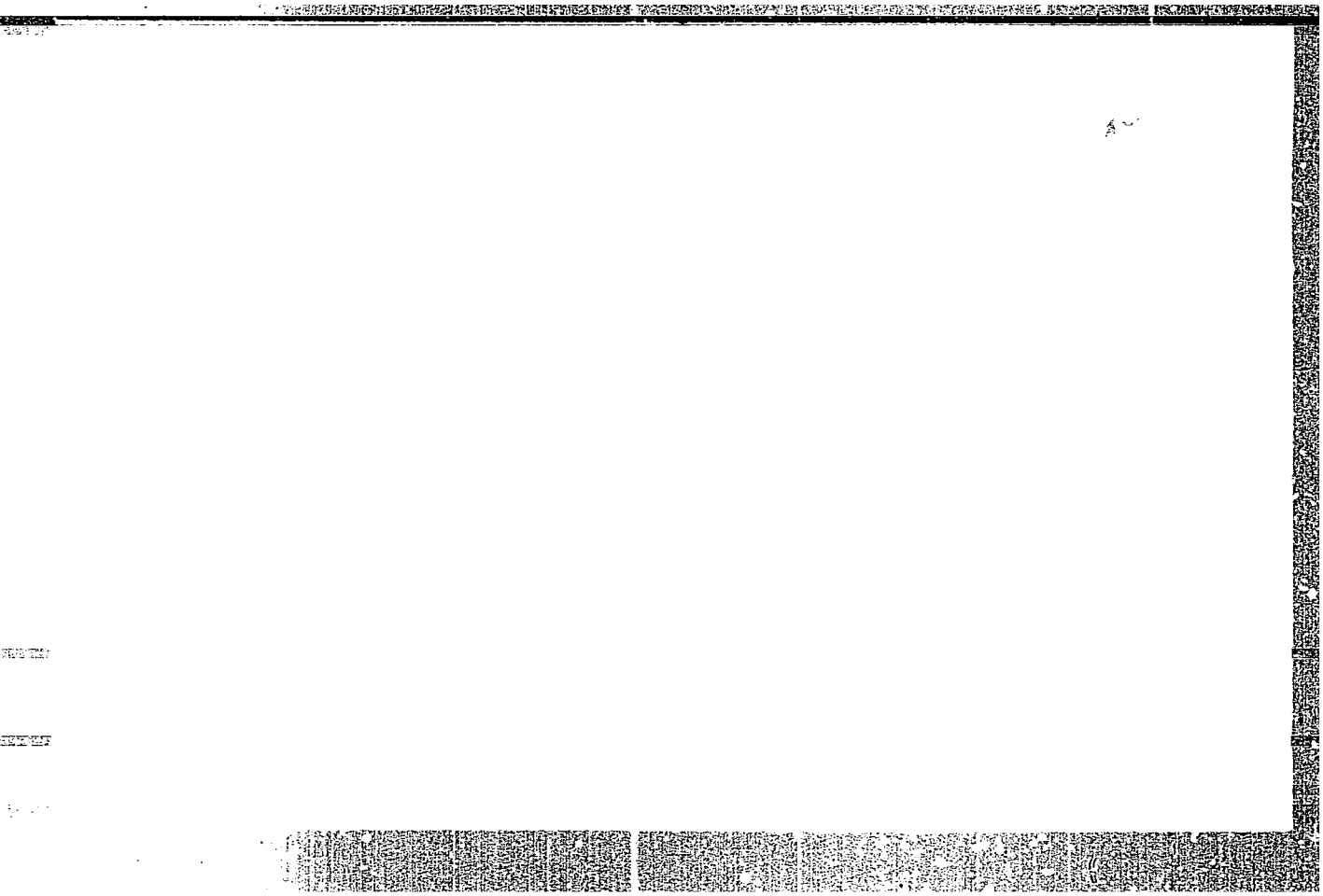
Name	Title of work	Nominated by
Khalatnikov, I.M.	Research on the theory of superfluidity (series of articles)	Institute of Physical Problems Academy of Sciences USSR

[illegible] 7 July 1954



Khalatnikov, I.M.

✓ The dispersion of neutrons with energies of the order of ε



APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000721710012-0"

USSR/Physics - Relativistic hydrodynamics FD 977

Card 1/1 Pub. 146 - 1/20

Author : Khalat'nikov, I. M.

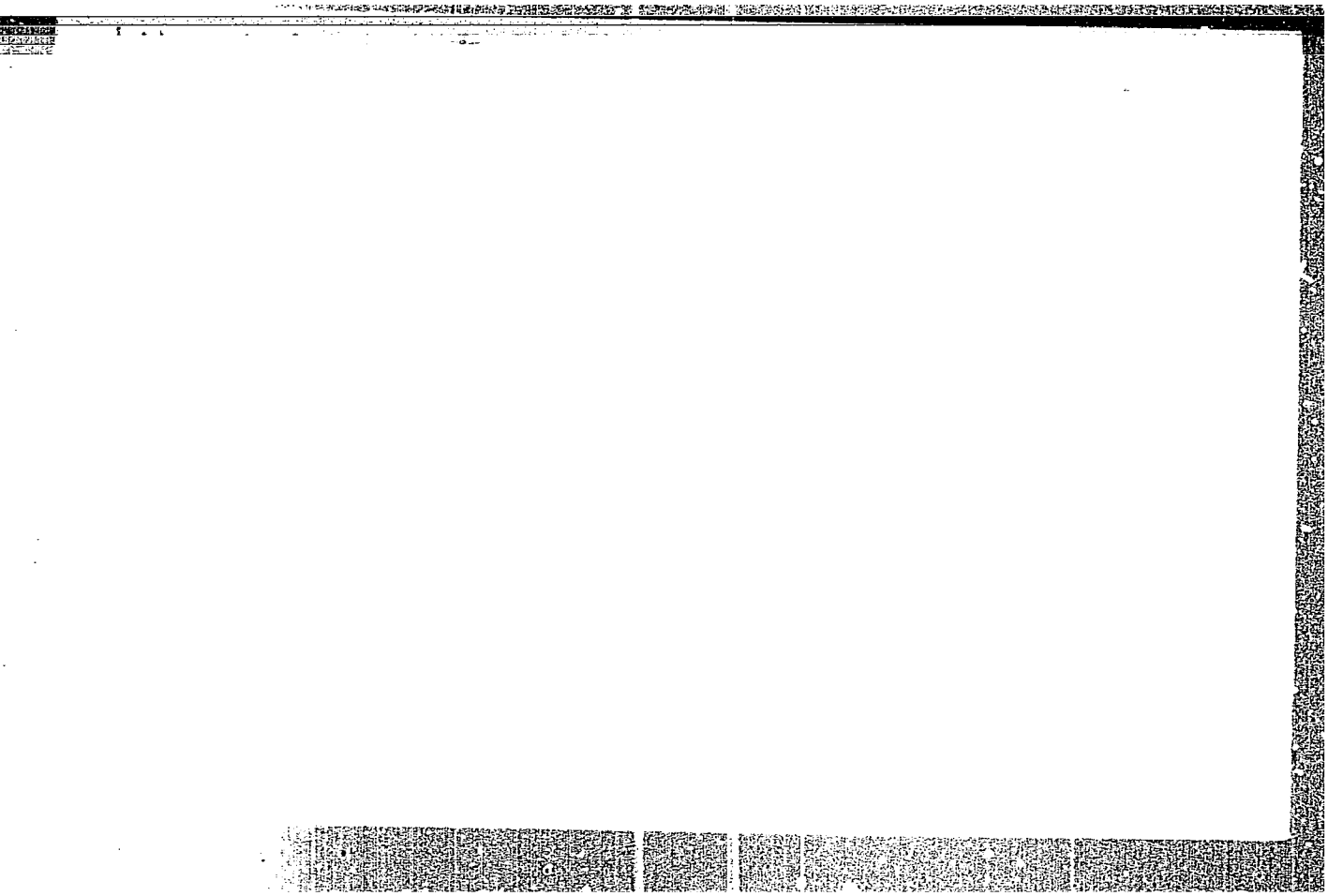
Title : Some problems of relativistic hydrodynamics

Periodical : Zhur. eksp. i teor. fiz., 27, No 5 (11), 529-541, Nov 1954

Abstract : The author develops a variational method which permits one to find the equations of relativistic hydrodynamics. He finds the relativistic analog of potential motion. He clarifies the form of the Bernoulli equation for such motion, and discusses the properties of the relativistic shock adiabatic and also the propagation of sound of large amplitude. Finally the author finds the exact solution of the general one-dimensional problem in relativistic hydrodynamics. Acknowledges the helpful counsel of Academician L. D. Landau and S. P. D'yakov (just recently deceased). Four references, two USSR (e.g. L. D. Landau and Ye. M. Lifshits, Mekhanika sploshnykh sred [Mechanics of continuous media], 2nd edition, 1953).

Institution : Institute of Physical Problems, Academy of Sciences USSR

Submitted : January 7, 1954



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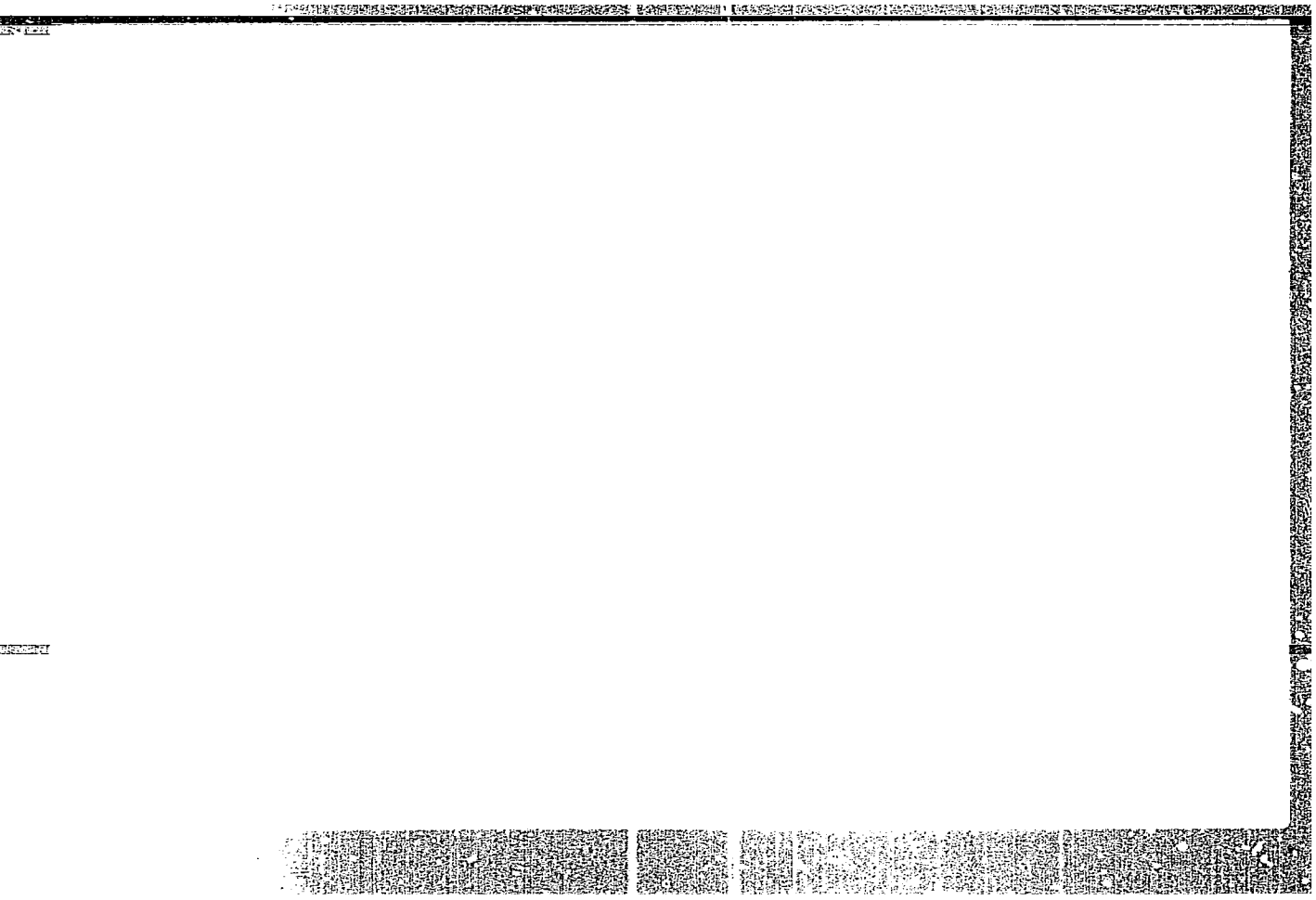


USSR/Physics - Quant. electrodynamics

Card 1/1

Authors : Landau, L. D., Academician; Abrikosov, A. A., Khalatnikov, I. M.

Title : Asymptotic expression of the Green photon function in quantum electrodynamics.

Periodical : Reports of the Acad. of Scs. of the USSR 95, 6, 1177 - 1180, 21 Apr 1954

Abstract : An asymptotic expression for the Green photon function ($D_{\mu\nu}$) used in quantum electrodynamics is derived. The article contains a diagram.

Institution : Acad. of Scs. of the USSR

Submitted : 25 Feb 1954

[illegible], I. M.
USSR/Physics

Card 1/1

Authors : Landau, L. D. Academician; Abrikosov, A. A.; and Khalatnikov, I. M.

Title : Electron mass in quantum electrodynamics

Periodical : Dokl. AN SSSR, 96, Ed. 2, 261 - 264, May 1954

Abstract : The problem of electron mass and particularly the problem concerning the role of the electro-magnetic and natural mass of the electron is one of the most interesting problems of quantum electrodynamics. Of basic importance in solving this problem is the characteristic of the Green function of the electron G(p) when $p \sim m$. Equations enabling one to solve such a problem are given. Three references all USSR.

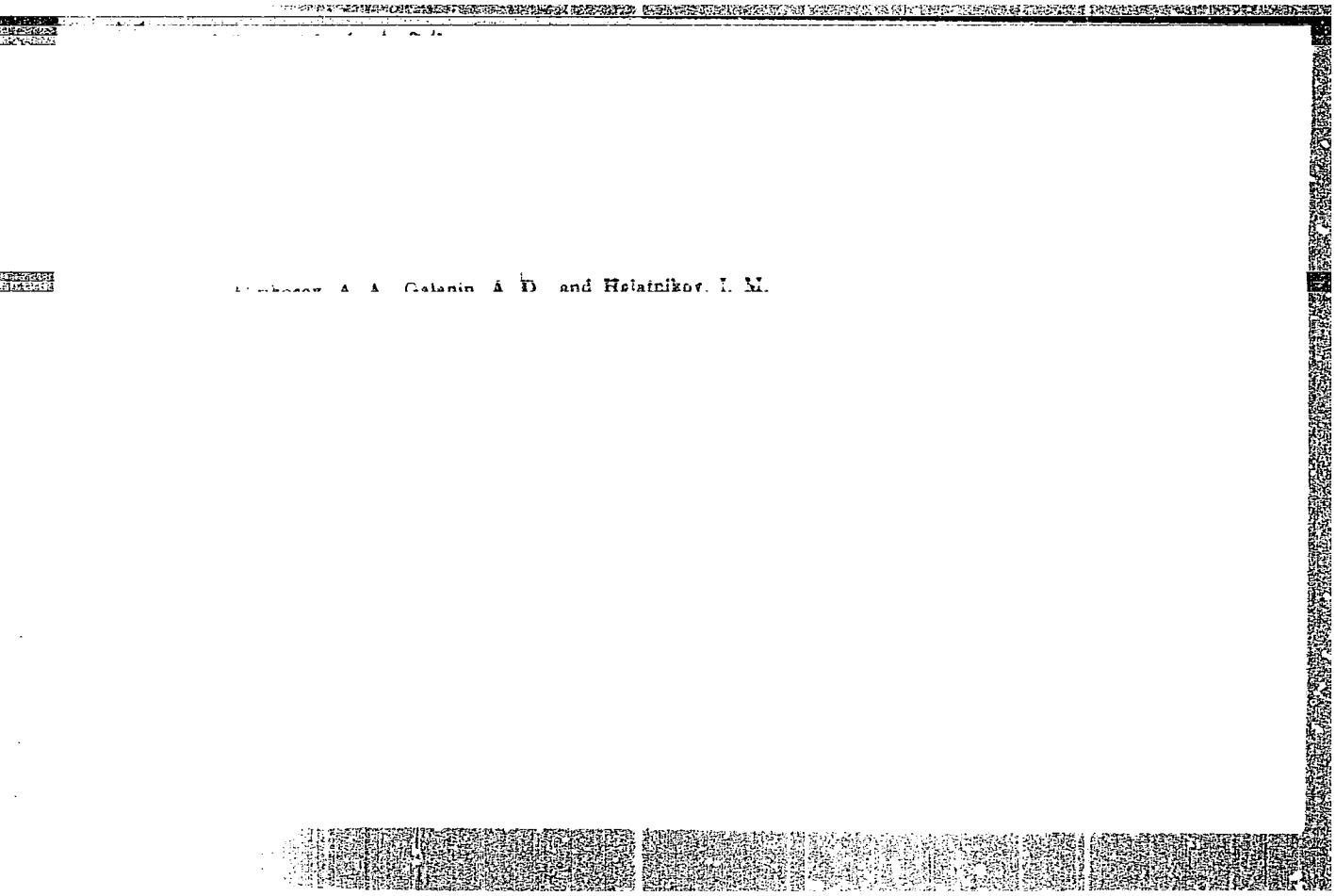
Institution : .....

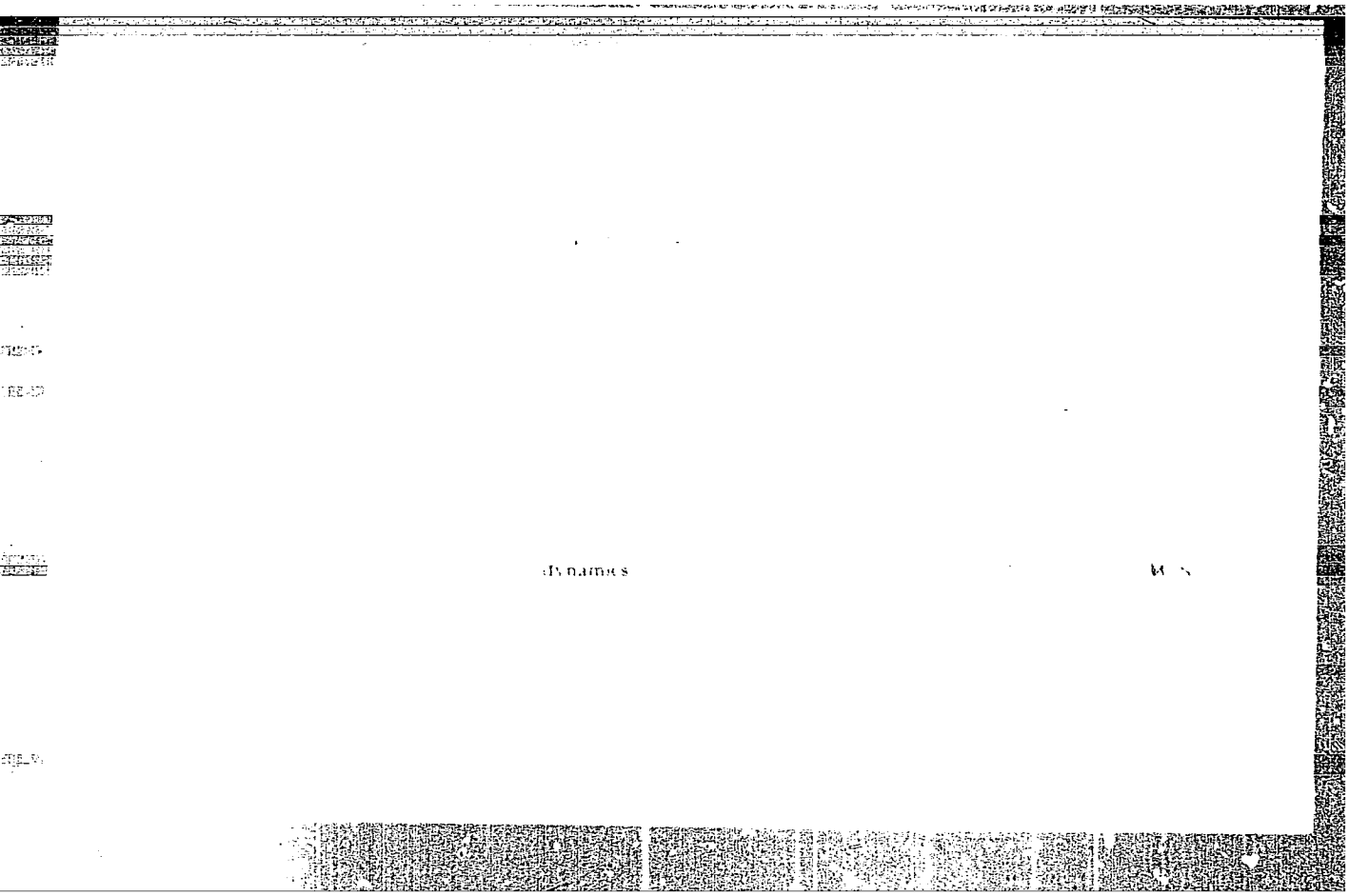
Submitted : March 6, 1954

KHALATNIKOV, I. M.

LANDAU, L.D., akademik; KHALATNIKOV, I.M.

Anomalous absorption of sound near to the second-order phase transition. Dokl.AN SSSR 96 no.3:469-472 My '54. (MLRA 7:6)
(Low temperature research) (Sound waves)





USSR/Physics - Electrodynamics FD-2219

Card 1/1 Pub. 146-24/25

Author : Khalapnikov, I. M.

Title : Representation of Green's functions in quantum electrodynamics in the form of continual integrals

Periodical : Zhur. eksp. i teor. fiz, 28, 633-636, May 1955

Abstract : In quantum electrodynamics Green's functions for one or another problem can be written in the form of matrical elements of certain T-ordered products of electron and photon fields taken between states of a nondisturbed vacuum; e.g. the Green function for the one-electron problem has the form $G_{ab}(x,x') = \text{ave.}\ [T(\psi_a(x)\bar{\psi}_b(x')S/S_{vac}]$, where S_{vac} is the average vacuum value of the S matrix $S=\exp[-i/H(x)dx]$ and T designates the operation of relativistically invariant chronologization (D. Glaser, Phys. Rev. 91, 1953). The author's aim in the present note is to represent the expressions for the Green's function in the form of continual integrals in the space of psi ψ and A functions (loc. cit.). He thanks Academician L. D. Landau and B. L. Ioffe. Five references, including one USSR: I Gel'fand and R. Minlos, DAN SSSR, 97, 1954.

Institution : Institute of Physical Problems, Academy of Sciences USSR

Submitted : December 25, 1954

KHALATNIKOV, I. M.

The gradient transformation of the Green function of charged particles. L. D. Landau and I. M. Khalatnikov. *Zhur. Eksptl. i Teoret. Fiz.* 29, 89–93(1955).—The problem has been solved of how to do a gradient transformation of the Green function and of the max. for charged particles, which are interacting with an electromagnetic field.

Werner Jacobson

(1)

Inst. Physical Problems, AS USSR

USSR/Physics -- Viscosity FD-2884

Card 1/1 Pub. 146 - 21/26

Author : Khalatnikov, I. M.

Title : Second viscosity of monoatomic gases

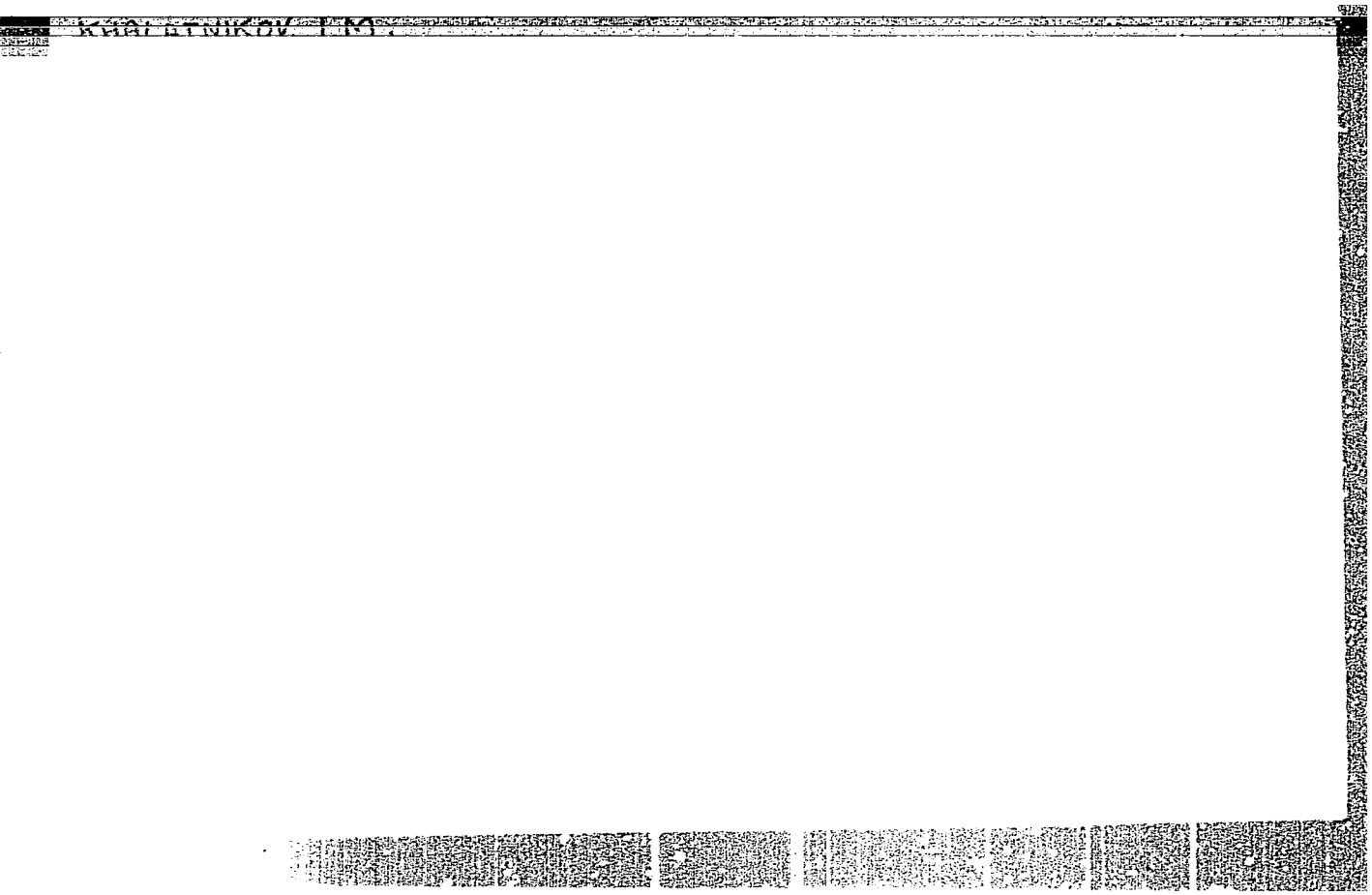
Periodical : Zhur. eksp. i teor. fiz., 29, August 1955, 253-254

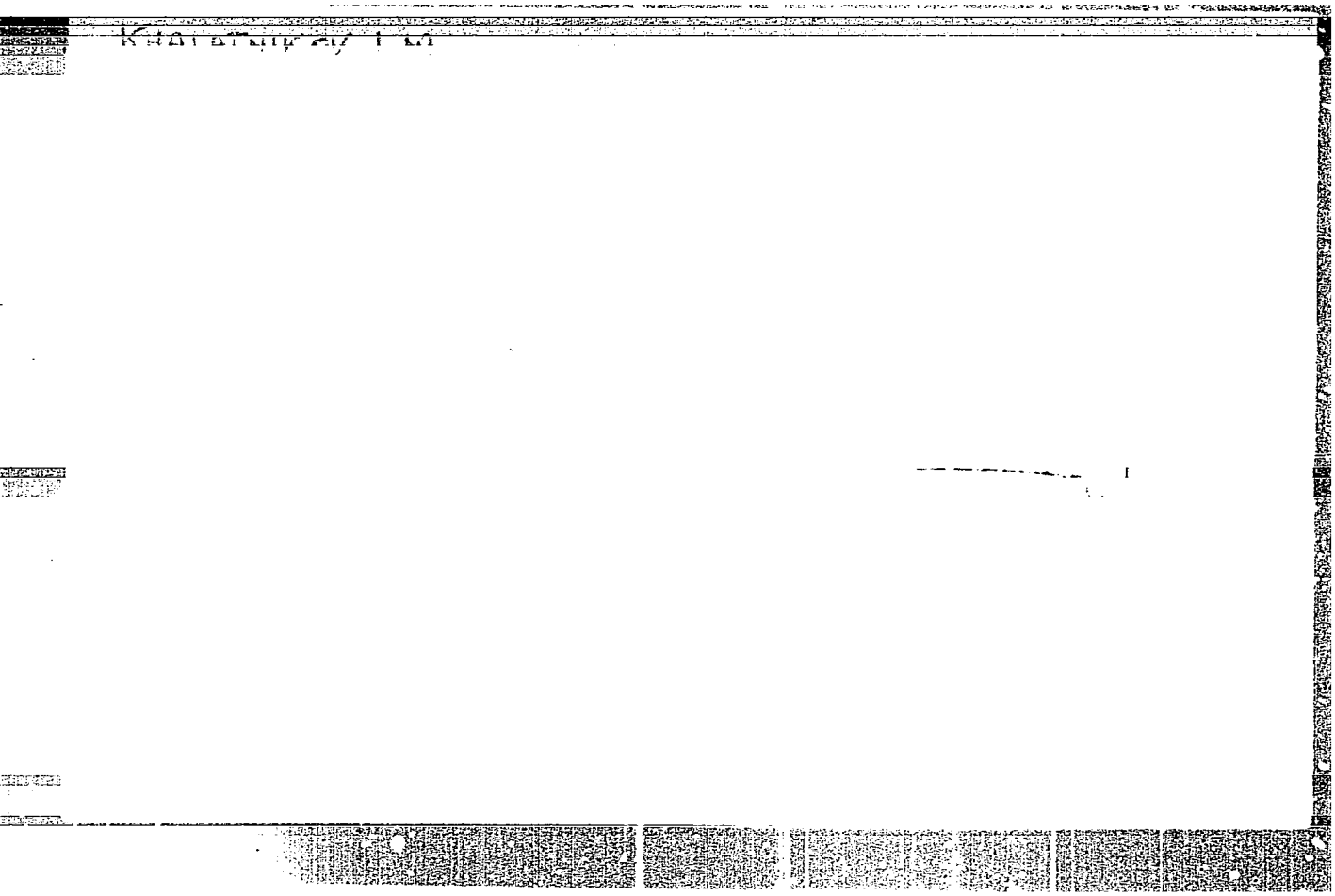
Abstract : As shown (L. D. Landau, Ye. M. Lifshits, Mekhanika sploshnykh sred [Mechanics of continuous media], Moscow-Leningrad, 1944), a monoatomic gas obeying Boltzmann statistics and possessing an energy spectrum of the form $e=p^2/2m$ does not possess second viscosity. In the present note the writer shows that this result holds true also in the case where the monoatomic gas (an ensemble of particles each of which is characterize by three degrees of freedom, i.e. by a 3-dimensional momentum vector p) obeys quantum statistic, Fermi or Bose, if only the energy is a power function of the momentum of the particle: $e = ap^n$. Two references: e.g. Landau, Lifshits, Statisticheskaya fizika, GITTL, 1951.

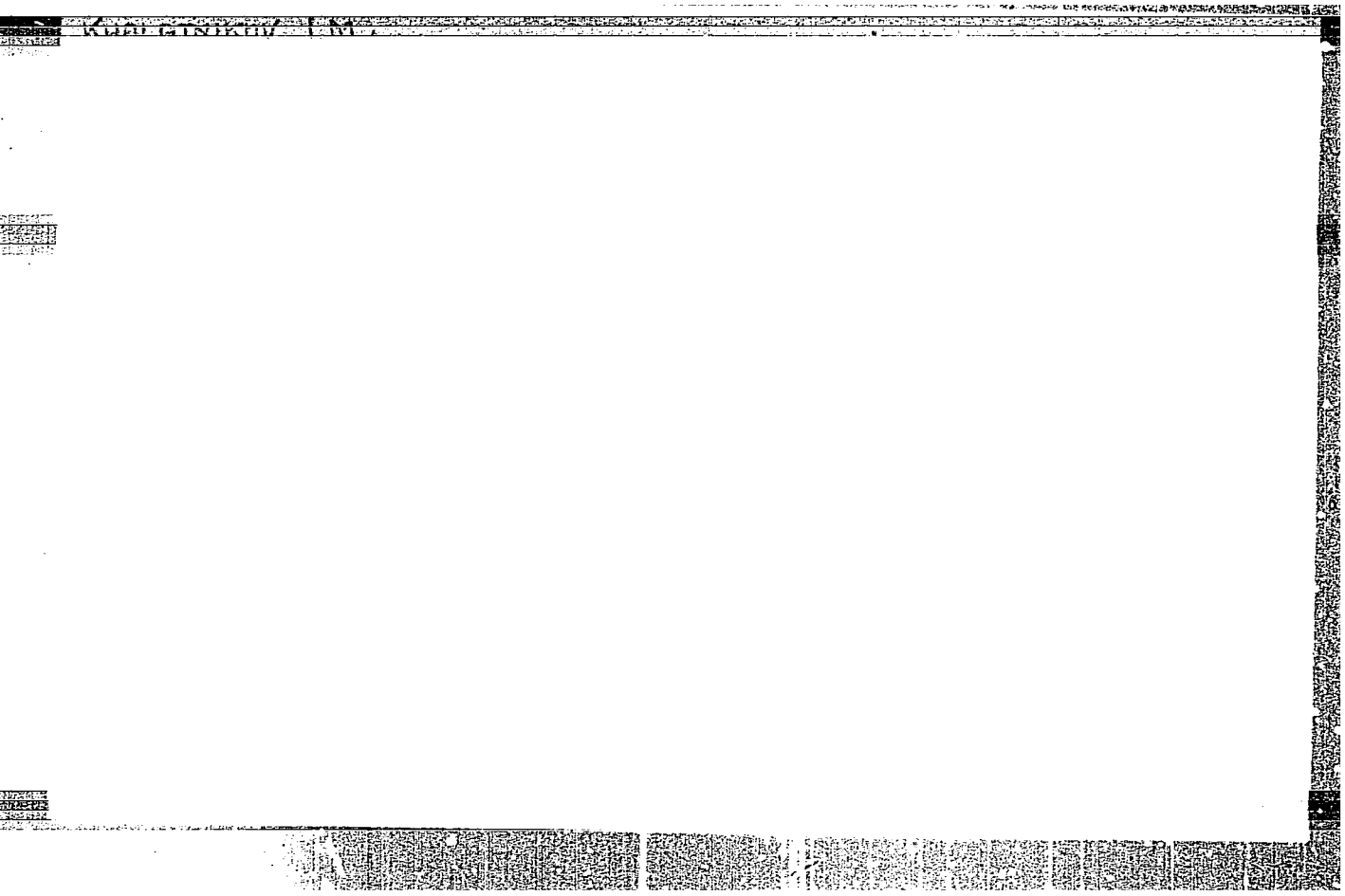
Institution : Institute of Physical Problems, Academy of Sciences USSR

Submitted : March 28, 1955

Translation D 419421, p.111







Khalatnikov, I. M.

Gradient transformation of the Green function of charged particles. L. D. Landau and I. M. Khalatnikov. *Soviet Phys., JETP* 2, 69-72(1956)(Engl. translation). See C.A. 49, 15511c. B. M. R.

Category : USSR/Atomic and Molecular Physics Low-Temperature physics D-5

Abs Jour : Ref Zhur - Fizika, No 1, 1957, No 885

Author : Khalatnikov, I.M.

Title : On the Propagation of Sound in Moving Helium II. And on the Effect of the Heat Flow on the Propagation of the Second Sound.

Orig Pub : Zh. eksperim. i teor. fiziki, 1956, 30, No 3, 617-619

Abstract : Analysis of the equations of propagation of the ordinary and second sound in He II in the presence of arbitrary (constant) velocities of the components. It is shown that during the propagation of the traveling wave of the second sound along the thermal stream in He II, an "erosion" of the second sound will occur. An equation is given for the magnitude of this effect. The erosion may occur both along the direction of the thermal flow, as well as in opposition to the flow, depending on the temperature of He II. It is shown that the effect of the thermal stream on the velocity of the standing waves of the second sound is a second-order effect.

Card : 1/1

Inst. Physical Problems im. Kapitsa, Acad. Sci. USSR

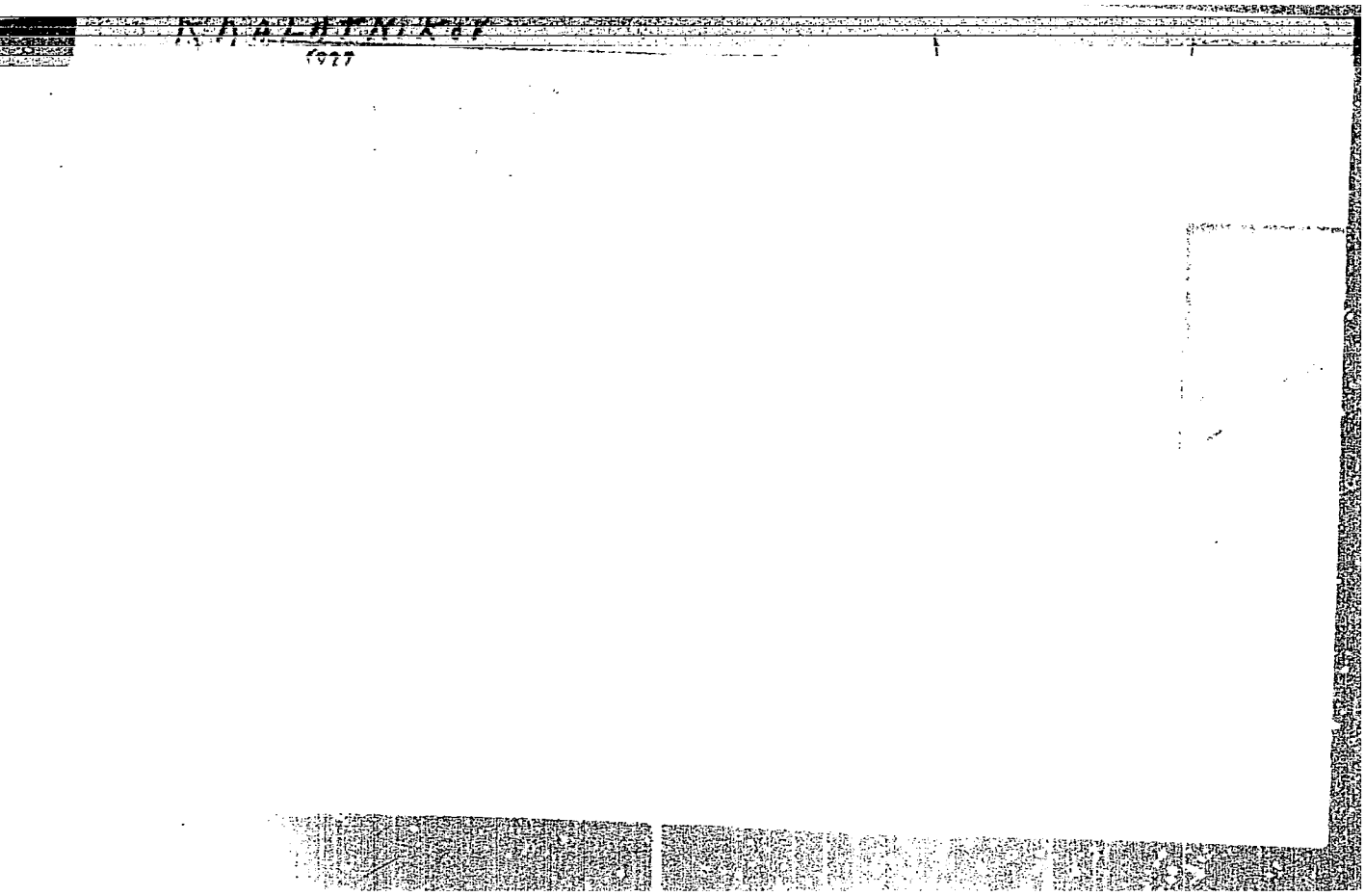
CHALATNIKOV, I.M. CHALATNIKOV, I.M.

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1885
AUTHOR GOR'KOV, L.P., CHALATNIKOV, I.M.
TITLE The Electrodynamics of the Charged Scalar Particles.
PERIODICAL Žurn. eksp. i teor. fis, 31, fasc. 6, 1062-1078 (1956)
Issued: 1 / 1957

L.D.LANDAU, A.A.ABRIKOSOV and I.M.CHALATNIKOV investigated the asymptotic behavior of GREEN'S functions in the case of high momenta of electrodynamics with spin 1/2 by means of the direct solution of integral equations. The corresponding steps are taken in the course of the present work with respect to the electrodynamics of the particles with spin zero in KEMMER'S formalism.

At first KEMMER'S β-formalism is discussed; it is very similar to DIRAC'S equation for the electron. Also the interaction between mesons and the electromagnetic field can be described by means of the KLEIN-GORDON- and also by means of β-formalism. The scattering of light by light results in a finite expression in the case of summation over all permutations of the emitted quanta. The following is discussed in detail: GREEN'S function of the photon, GREEN'S function of the meson, the basic equations, and the gradient transformation of GREEN'S function of the meson.

Summary: The present investigation shows that the electrodynamics for spin zero is formally similar to that for spin 1/2, but conditions in this instance are, in general, more complicated. When deriving the integral equations the results obtained by the perturbation theory must be widely used.



KHALATNIKOV, I.M.

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1550
AUTHOR CHALATNIKOV,I.M.
TITLE The Hydrodynamics of Helium II.
PERIODICAL Usp.fis.nauk, 60, fasc. 1, 69-160 (1956)
Issued: 11 / 1956

Comparison is invited with the author's previous work entitled:"The Theory of Kinetic Phenomena in He II", Usp.fis.nauk, 59, 673 (1956). This survey is arranged as follows:

I. The hydrodynamics of He II: The hydrodynamic equations of He II which apply in the case of any (not small) velocities of motion (two motions are supposed to take place simultaneously in He II: a supersonic potential motion and a normal motion); the dissipative function for liquid He II, sound in He II (its propagation in He II is described by a system of nonlinear equations which can be linearized in a given case); the absorption of sound in He II (the relaxation times which characterize the production of excitations in He II, the absorption of the first and second sound in He II); on the anomalous absorption of sound near the λ point.

II. The hydrodynamics of the solutions: The equations of the hydrodynamics of the solutions of foreign particles in He II (the behavior of the dissolved foreign particles, normal thickness, entropy, heat capacity), dissipative processes in the solutions, sound in the solutions of foreign particles in He II, the hydrodynamics of the solutions of two superliquid liquids.

Usp.fis.nauk, 60, fasc. 1, 69-160 (1956) CARD 2 / 2 PA - 1550
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III. Discontinuities and the sound of high amplitude in He II: Discontinuities in He II (pressure jumps, shock waves, temperature jumps), sound with high amplitude in He II, on the propagation of sound in moving He II, and on the influence exercised by heat flow on the propagation of second sound.

IV. The heat transfer between solids and He II: The quantization of elastic waves (longitudinal, transversal, and surface waves), the energy radiation of the oscillating surface of a solid, the energy exchange on the occasion of collisions of rotons and phonons with a solid wall, the heat transfer between a solid and liquid He II, the passage of second sound through metal plates, the absorption of second sound on the walls of a cylindrical vessel.

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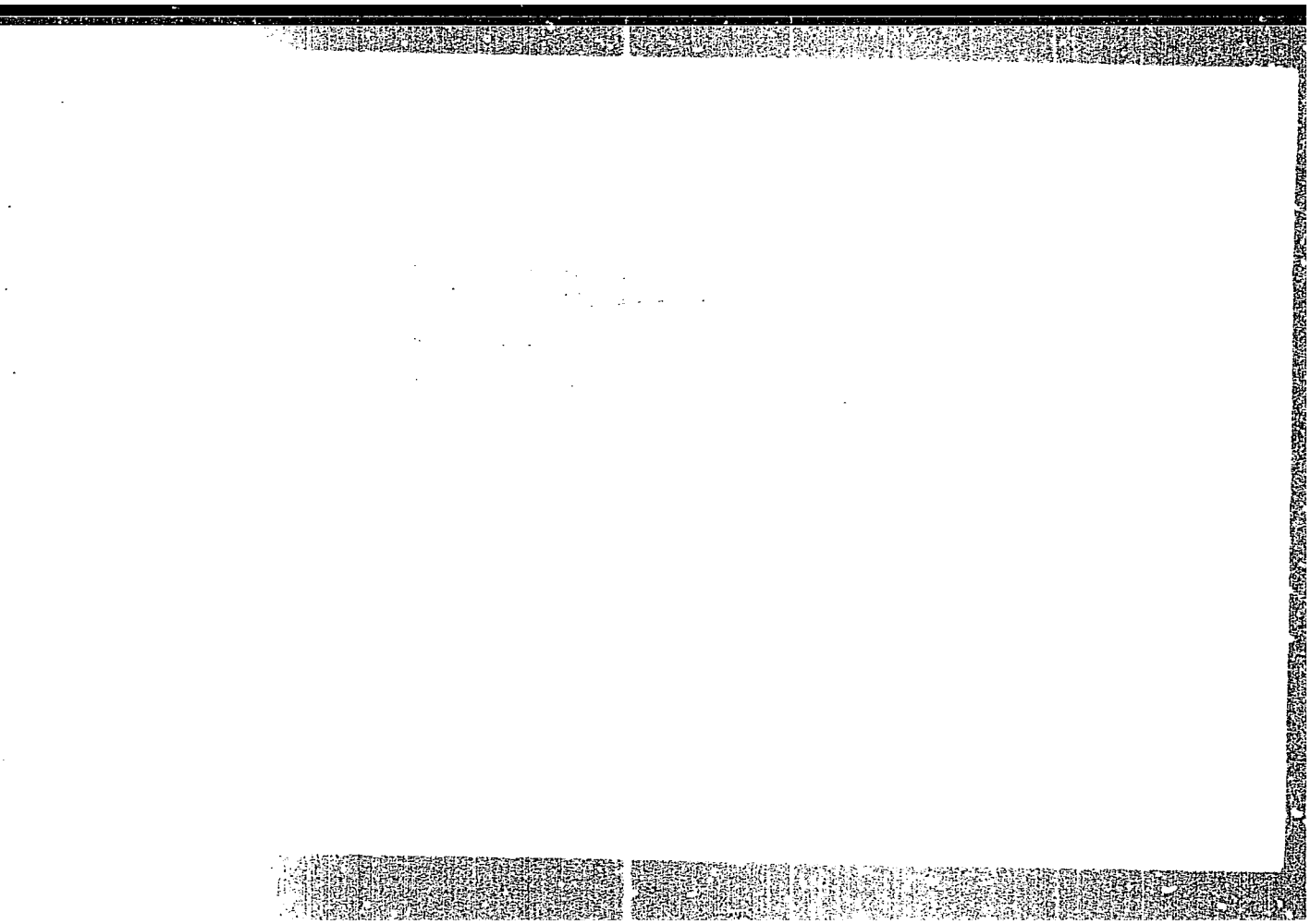

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Khalatnikov, I.M.

SUBJECT: USSR/General Nuclear Research 25-4-3/34

AUTHOR: Abrikosov, A.A., Doctor of Physicomathematical Sciences
Khalatnikov, I.M., Professor of Physicomathematical Sciences.

TITLE: Interaction between elementary particles (Vzaimodeystviye Elementarnykh Chastits)

PERIODICAL: Nauka i Zhizn' April 1957, # 4, pp 9-10 (USSR)

ABSTRACT: This article deals with the very important problem of modern physics - the study of interactions between elementary particles. Without a detailed theory based on such research it is impossible to understand the nature of the forces acting in atomic nuclei, their structure, and thenphysics of numerous nuclear processes. Physicists all over the world are interested in the theory on the interaction of elementary particles. The latest physical theory is a development in the direction of former ideas. The basic object of studies covering contemporary physics are the elementary particles of the matter we are surrounded by. One of these particles is the electron. L.D. Landau, I.Ya. Pomeranchuk and the authors of this article were the first to find methods of analyzing the interactions

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TITLE: Interaction between elementary particles (Vzaimodeystviye Elementarnykh Chastits) 25-4-3/34

of arbitrary forces. The results were quite unexpected. It was established that the interaction becomes weaker when the area is smaller on which it is spread. The situation changes entirely with regard to nuclear forces, i.e. forces acting between particles inside an atomic nucleus (protons and neutrons). Those interactions are very strong.

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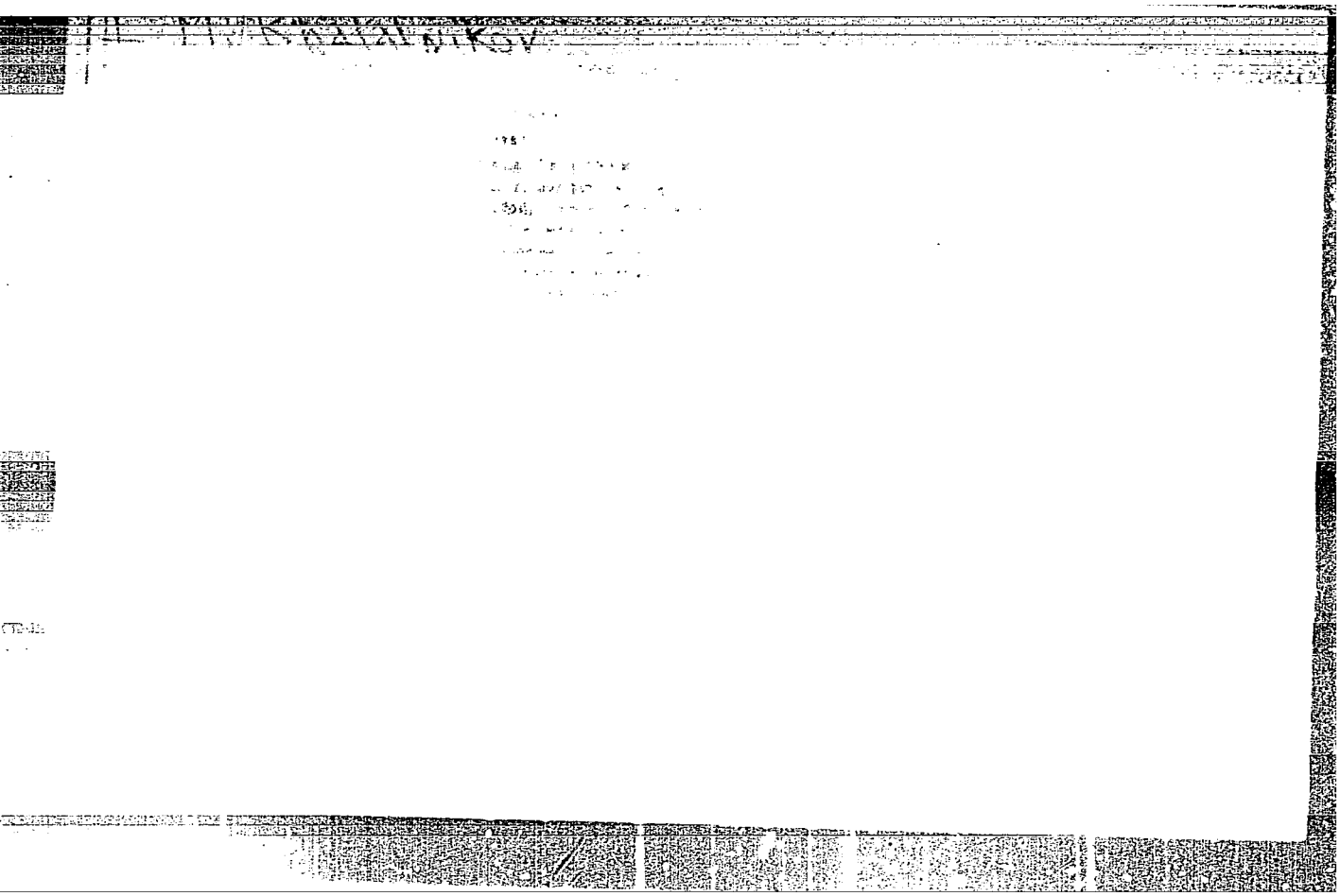

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000721710012-0"

AUTHOR KHALATNIKOV, I.M.

TITLE The Hydrodynamics of the Solutions of Two Superliquid Liquids. (Gidrodinamika rastvorov dvukh sverkhtekuchikh zhidkostey -Russian) 56-4-3/52

PERIODICAL Zhurnal Eksperim. i Teoret.Fiziki,1957,Vol 32,Nr 4,pp 653-657 (U.S.S.R.)

Received 7/1957 Reviewed 8/1957

ABSTRACT When deducing the equations of this hydrodynamics the author starts from the laws of conservation. Both superconductive liquids may, for instance, be liquid He^4 and liquid He^6. IN this case these motions are in principle possible in the liquid- a normal one with the velocity $\vec{v}_n$ and two superliquid ones with the velocities v_s' and v_s'' respectively. When deducing the motions, the liquid in such a system of reference is assumed, in which the normal(and not the superliquid)part of the liquid is at rest. At first an expression is given for the total energy of the liquid. Next, the form of thermodynamic identity(?) id derived. On the occasion of the transition of the system of reference connected with the normal motion, the inner energy had to be regarded as a function of density,entropy and relative velocity. Next, the laws of conservation are given for the energy $\vec{E}$, the momentum of the liquid, the amount of matter and entropy. By utilization of these laws of conservation the form of the unknown functions has to be determined. Carrying out of computations is followed step by step. After investigation of various boundary cases the form of the unknown functions can be determined uniquely. The existence of three motions in the solutions of the superliquid liquids may lead to various peculiar phenomena,i.e. to the propagation of three types of sound oscil-

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AUTHOR KHALATNIKOV, I.M., ABRIKOSOV, A.A. 56-4-33/52

TITLE The Thermodynamics of Liquid He^3
(Termodinamika zhidkogo He^3. Russian)

PERIODICAL Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol 32, Nr 4, pp 915 - 919
(U.S.S.R.)

ABSTRACT Starting out from Landau's model of the Fermi liquid (L. Landau, Zhurn. eksp. i teor. fis., Vol 39, p 1058 (1956), the paper under review investigates the thermodynamics of liquid helium. In case of small deviations of the distribution function from its equilibrium value at $T = 0$ it is possible to represent the excitation energy in the form of $\varepsilon = \varepsilon(p) + \int f(p,p') \gamma(p') d\tau'$ $d\tau = g dp_x dp_y dp_z / (2\pi\hbar)^3$. In this context, we have $\gamma = n - n_0$, and g denotes the statistical equilibrium, ε does not depend on the spin. In the usually accepted model of the ideal gas of the excitations, the energy $\varepsilon(p)$ is written in the from of $p^2/2m$, with m denoting a certain effective mass. But the results obtained with this form of the spectrum are not in very good agreement with the experimental data. Therefore the authors of the paper under review investigate for $\varepsilon(p)$ another function proposed by L.D. Landau, namely $\varepsilon(p) = (p - p_0)^2 / 2m$, with m denoting the effective mass. In this case, the distribution function is a $T = 0$ not a sphere in the impulse space, but rather a spherical layer. In the paper under review its authors consider the thickness of this layer to be small as compared to its radius p_0. In the case of the spectrum $\varepsilon(p) = (p-p_0)^2/2m$, the temperature of the Fermi liquid is suitable, as a principle, only for such temperatures at which the deviations from the distribution function corresponding to zero are small. In the model of the ideal gas, this corresponds to the temperatures $T \ll T_e$, with T_e denoting the temperature of the degeneration. In this context there exists a temperature range, namely $T > T_e$, in which the deviation of the distribution function corresponding to zero is small. This circumstance makes possible the computation of the thermodynamic quantities in the Fermi region and in the Boltzmann region. The above-mentioned spectrum corresponds in a better way to the experimental data than the model of the ideal gas. On the other hand, this improvement is not so considerable as to exclude the model of the ideal gas for He^3. Then the paper under review concludes by discussing the heat capacity, the entropy and the magnetic susceptibility in greater detail.(3 reproductions).

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The Thermodynamics of Liquid He^3 56-4-33/52

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KHALATNIKOV, I.M.

Халатников И.М.

AUTHOR KHALATNIKOV, I.M., ZHARKOV, V.N. 56-5-22/55

TITLE The Theory of Diffusion and of Heat Conductance of the Weak Solutions of He^3 in Helium II.
(Teoriya diffuzii i teploprovodnosti slabykh rastvorov He^3 v gelii II - Russian)

PERIODICAL Zhurnal Eksperim.i Teoret.Fiziki,1957,Vol 32,Nr 5,pp 1108-1125 (U.S.S.R.)

ABSTRACT The paper under review employs Landau's theory of the superfluidity of Helium II. In order to determine the dependence of the kinetic coefficients of the solution upon the temperature and upon the concentration, it is necessary to determine the distribution functions which describe the behavior of gases of the elementary excitations in presence of zero different temperature gradients, of a concentration c, and of a velocity $\vec{v}_n$.The distribution functions are defined as solutions of a kinetic equation. At nonvanishing temperature gradients and concentrations there originates in the solution a motion of the normal and of the superfluid part of helium II, and this leads to additional terms in the left side of the kinetic equation. The kinetic equation- as obtained by taking into account the additional terms- for the admixture excitations in a weak solution of He^3 in helium II is written in its explicit form in the paper under review. Then in this equation those terms are left aside which are connected with the first and the second viscosity of the solution. The next chap-

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KHALATNIKOV, I.M.

AUTHOR KHALATNIKOV, I.M.

TITLE On the Magnetohydrodynamic Waves and on the Magnetic Tangential Shocks in Relativistic Hydrodynamics. 56-5-21/55
(O magnitogidrodinamicheskikh volnakh i magnitnykh tangentsial'nykh razryvakh v relyativistskoy gidrodinamike - Russian)

PERIODICAL Zhurnal Eksperim. i Teoret.Fiziki,1957,Vol 32,Nr 5,pp 1102-1107(USSR)

ABSTRACT Let the magnetic field enclose an arbitrary angle with the direction of propagation ofthe wave.In this context, the ultrarelativistic equation of state $\varepsilon = 3p$ is not presupposed. but the entire consideration of this question is rather conducted for an arbitrary equation of state. The author furthermore investigates in his paper the purely magnetic tangential shocks in relativistic hydrodynamics, at which the thermidynamic magnitudes remain constant.
The magnetohydrodynamic waves in relativistic hydrodynamics. First of all, the expressions for the energy momentum tensor in relativistic hydrodynamics and for the energy momentum tensor of the electromagnetic field are written down. In this context, a medium with infinitely high conductivity is examined. The electric field and the magnetic field are connected by the equation $\vec{E} = [-\vec{v}\vec{H}]$. The conditions prevailing at the shock places can be expressed for such a motion by the continuity of the relevant components of the complete energy momentum tensor. The conditions resulting therefrom are written down in their explicit form in the paper under review. Thus the first pair of the Maxwell's equations is still taken into account. The ma-

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gnetohydrodynamic waves can be considered to be a boundary case of shocks of very low intensity. The present paper lists the equation for the front of propagation of these waves for the general case.In the general case two waves are propagated with different velocities. In the ultrarelativistic case particles can be created at high temperatures. The second chapter of the paper under review deals with such tangential shocks at which the thermodynamic magnitude remain constant. Here again the present paper follows the computations step by step. In the tangential shocks here under consideration, the velocity does not change its absolute value, but this vector rather change only its direction at the shock places.
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KHALATNIKOV, I.M.

56-3-30/59

AUTHORS: Arkhipov, R.G., Khalatnikov, I.M.

TITLE: Propagation of Sound at the Boundary Between Two Superfluid Phases (Rasprostraneniye zvuka cherez granitsu mezhdu dvumya sverkhtekuchimi fazami)

PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol. 33, Nr 3, pp. 758-764 (USSR)

ABSTRACT: The passage of the first and the second sound at the boundary between two "superfluid" liquids is discussed theoretically. It could be proved that a conversion from one into the other is possible. Also in this case it is called conversion. The corresponding equations are given for the energy flow of the reflected, deflected, and converted waves, namely for the first and the second sound:

1) Both liquids are "superfluid". Concentration values differ $(\Delta c)^2 s\beta/\rho\alpha \gg 1$
2) Both liquids are "superfluid". Concentration values are nearly equal. $(\Delta c)^2 s\beta/\rho\alpha \ll 1$.
3) The second liquid is not "superfluid"
4) The first liquid is not "superfluid".

There are 5 Slavic references.

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KHALATNIKOV, I. M

56-3-47/59

AUTHOR: Khalatnikov, I.M.

TITLE: On the Hydrodynamical Fluctuations in a Superfluid Liquid (O gidrodinamicheskikh fluktuatsiyakh v sverkhtekuchey zhidkosti) (Letter to the Editor)

PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol. 33, Nr 3 (9), pp. 809 - 811 (USSR)

ABSTRACT: L. Landau and Ye. Lifshits (Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol. 32, pp. 618) computed the fluctuations of the hydrodynamical quantities in classical hydrodynamics by the introduction of "foreign terms" into the equations of motion. The author computed by means of this method the fluctuations of the hydrodynamical quantities in a superliquid liquid. For the sake of generality it is assumed here that foreign particles are dissolved in the superliquid liquid. Because of the unusual simplicity of the method this in no way complicates computations. First, the rather voluminous equations of the hydrodynamics of the solutions of a superliquid liquid with foreign bodies are written down. The following quantities are introduced into these equations : The extraneous tensor of the mo-

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AUTHOR: Abrikosov, A.A., Khalatnikov, I.M. 56-5-13/46

TITLE: On a Model of a Non-Perfect Fermi Gas (Ob odnoy modeli neideal'nogo Fermi-gaza)

PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol. 33, Nr 5, pp. 1154-1159 (USSR)

ABSTRACT: Computations by Huang (ref. 1) and other scientists of the properties of non-perfect Bose- and Fermi gases consisting of particles the measurements of which are small compared to their average wave length, are extremely voluminous. Another method of computation is now proposed by means of which it is comparatively easy to compute the thermodynamical quantities of Huang's model for the case of the Fermi statistic.
The energy of the basic state (E) and the effective mass (m/m^*) of the excitation of a Fermi gas is:

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On a Model of a Non-Perfect Fermi Gas 56-5-13/46

$$E = \int \mu dN = E^{(0)} + \frac{\pi a \hbar^2}{m} N^2 \left[1 + \frac{6}{35}\left(\frac{3}{\pi}\right)^{1/3} a N^{1/3} (11 - 2\ln 2)\right]$$

and

$$\frac{m}{m^*} = 1 - \left(\frac{8}{15}\right)\left(\frac{3}{\pi}\right)^{2/3} (7\ln 2 - 1) a^2 N^{2/3}$$

There are 1 figure and 6 references, 3 of which are Slavic.

ASSOCIATION: Institute for Physical Problems AN USSR (Institut fizicheskikh problem AN SSSR)

SUBMITTED: April 24, 1957

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"New Symmetry Properties of Elementary particles," by A. A. Abrikosov, Doctor of Physicomathematical Sciences, and Prof I. M. Khalatnikov, Institute of Physical Problems imeni S. I. Vavilov, Academy of Sciences USSR, Priroda, No 5, May 57, pp 5-10

This work reviews the parity nonconservation problem and explains Landau's "combined inversion" idea. Popular language is used throughout. Lee and Yang's two-component theory of the neutrino and experiments at Columbia to verify the theory are discussed.

The article includes the following remarks on Landau's theory: "L. D. Landau proposed that there is no simple symmetry with respect to charge conjugation such as the symmetry with respect to inversion. However, there does exist symmetry with respect to a combination of these two operations. L. D. Landau called this 'combined inversion'. This means that everything remains unchanged if all directions are simultaneously reversed and the particles are replaced by antiparticles.

"It is easily seen that under these conditions empty space does not exhibit any asymmetries, since there are no electric charges in it. Thus, according to Landau's idea, it is not the space which is asymmetrical, but the particles in it. Landau clarified his notion with the following example. When any object is placed in front of a mirror, it seems to us that the reflection which we see is identical to the object, with the exception that everything on the left side of the object is on the right side in the reflection. In actuality, this is not so. The reflection which we see in the mirror would, if it actually existed, differ from the object in the fact that it consisted, not of atoms, but of antiatoms (positrons, antiprotons, and antineutrons).

"It is well-known that a particle is annihilated when it collides with its antiparticle.... Since the object cannot pass through the mirror and its reflection is not a real object, there is no danger of its being annihilated by its reflection. (U)

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ABRIKOSOV, A.; KHALATNIKOV, I.

Modern theory on superconductivity. Usp. fiz. nauk. 6 no.4:551-591 Ag '58. (MIRA 11:10)
(Superconductivity)