

N L 10246-66 EWT(1)/EWP(e)/EWT(m)/EPE(n)-2/T/EWP(t)/EWP(k)/EWP(z)/EWP(l)  
 A/C NR: AP5028908 EWA(c) IJP(c) SOURCE CODE: UR/0020/65/165/003/0524/052  
 44, 55  
 AUTHOR: Konobeyevskiy, S. T. (Corresponding member AN SSSR); Klimenkov, V. I. 44, 55  
 Kosenkov, V. M. 44, 55  
 ONY: none  
 TITLE: An x-ray investigation of radiation defects in beryllium oxide 19  
 SOURCE: AN SSSR. Doklady, v. 165, no. 3, 1965, 524-525 27 27  
 TOPIC TAGS: beryllium compound, radiation defect, neutron irradiation, Laue pattern, x ray diffraction, crystal, inorganic oxide, x ray investigation, crystal lattice, crystal anisotropy  
 ABSTRACT: Samples of sintered BeO were irradiated with an integrated flux of  $2 \times 10^{21}$  fast neutrons at a temperature less than 100C. As a result of irradiation the samples disintegrated into powder. The size of the powder particles formed by irradiation was found to be equal to the grain size of the unirradiated samples ( $\sim 10 \mu$ ). Each powder particle was a monocrystal. The diffraction lines of unirradiated samples showed an undistorted structure. Irradiation resulted in broadening of the diffraction lines and a decrease in the line intensity. At all angles  $2\theta > 95^\circ$  no diffraction peaks could be discerned from the background. The broadening of the peaks was sharply anisotropic. The width of the line (010) was practically unaltered, while the line (002) was broadened 3.5 times. The degree of broadening of the other lines depended on the angle between the diffraction and the base planes. Anisotropic broadening was also observed in the powder patterns, indicating that

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anisotropy can probably be attributed to internal distortions of the BeO lattice. The broadening of the line (002) on exposure to an integrated flux of  $2 \times 10^{20}$  fast neutrons/cm<sup>2</sup> and greater was very complex. Simultaneously with an anisotropic broadening of the line the authors reported an anisotropy in the increase of the lattice constant exposed to irradiation. The Laue pattern of a particle of powder (70 x 60 x 100 μ) formed by irradiation showed two series of spots: the normal pattern and a series of broadened spots. The origin of the latter could not be adequately explained. The experimental data were interpreted as indicating that irradiation with  $nvt = 2 \times 10^{20}$  fast neutrons/cm<sup>2</sup> produced single defects which upon further exposure formed clusters causing the distortion of the crystal lattice of BeO. Orig. art. has: 3 figures and 1 table. [CS]

SUB CODE: 20/ SUEM DATE: 08Apr65/ ORIG REF: 001/ OTH REF: 009/ ATD PRESS:

4161

CC  
Card 1/2

KOSENKOV, Yu.

The cultural commission of institution of higher learning, Sov.  
profsoiuzy 4 no.12:50-52 D '56. (MLRA 10:1)

1. Predsedatel' komissii po kul'turno-massovoy rabote profkoma  
Politeknicheskogo instituta imeni A.A. Zhdanova.  
(Social group work)

MELEKHINA, V.P.; Primalni uchastiy: DYUZHEVA, Yu.V., khimik; AGISHEVA, A.S., khimik; KUKAINA, V.P., khimik; KOSENKOVA, A.M., khimik

Materials for setting up a sanitary protective zone for Klin Thermometer Manufacturing Factory. Uch. zap. Mosk. nauch.-issl. inst. san. i gig. no.6: 41-44 '60. (MIRA 14:10)

1. Klinskaya sanitarnaya epidemiologicheskaya stantsiya (for Agisheva).
2. Moskovskaya oblastnaya sanitarnaya epidemiologicheskaya stantsiya (for Kukaina, Kosenkova).
3. Moskovskiy nauchno-issledovatel'skiy institut sanitarii i gigiyeny imeni F.F.Erismana (for Dyuzheva).  
(KLIN--AIR--POLLUTION) (MERCURY--TOXICOLOGY)

KOSENKOVA, A. S.

Kosenkova, A. S. -- "Investigation of the Effect of Plastifiers on the Technological Properties of Crude Mixtures and the Physicomechanical Properties of Vulcanizers Based on Divinyl-Styrol Rubber." Min Higher Education USSR. Moscow Inst of Fine Chemical Technology imeni M. V. Lomonosov. Moscow, 1956. (Disseration For the Degree of Candidate in Technical Sciences).

So: Knizhnaya Letopis', No. 11, 1956, pp 103-114

ACCESSION NR: AP4017165

S/0138/64/000/002/0024/0027

AUTHORS: Yurovskiy, V. S.; Arkhipov, A. M.; Lepetov, V. A.; Kosonkova, A. S.;  
Novikov, V. I.; Tsybuk, B. S.

TITLE: Investigation of sealing effectiveness of rubber metal seals

SOURCE: Kauchuk i rezina, no. 2, 1964, 24-27

TOPIC TAGS: rubber metal seal, sealing, rubber hardness, sealing force, rubber  
SKS 30

ABSTRACT: The rubber-metal sealing configuration shown in Fig. 1 on the Enclosure was investigated, using rubber inserts with different properties (TM-2 hardness 85-95, 75-85, and 55-65). It was found that the hardness of the rubber insert played the most important part in securing the sealing effectiveness. Experiments showed that hardness was related to the modulus of elasticity  $E_{60}$  (after a 60-minute compression) by a single curve for all types of rubber used ( $E_{60} = \frac{F}{S_0} \frac{h_1}{h_0 - h_1}$ ;  $S_0 =$  initial area). By pushing the metal ring into the rubber seal to a depth  $h$  and pressurizing the seal with air until it leaked, it was determined

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ACCESSION NR: AP4017165

that the following relation described the critical pressure:

$$P_{cr} = \left( \frac{Q}{d_{cp} b} - n E_{so} \frac{h}{h_0} \right) \frac{K d_{cp} b}{r^3}, \text{ kg/cm}^2$$

(where Q = load on seal, for  $d_{cp}$ , b,  $h_0$  and r, see Fig. 1, K = empirical constant which varied from 0.85 to 0.95, n = empirical constant which varied from 2 to 2.5). This equation permits the calculation of the pressure at which a seal will leak or, conversely, calculation of the sealing force Q required to seal a joint at a certain pressure. Orig. art. has: 5 figures and 2 formulas.

ASSOCIATION: Nauchno-issledovatel'skiy institut rezinovoy promy'shlennosti (Scientific Research Institute of the Rubber Industry)

SUBMITTED: 00

DATE ACQ: 23Mar64

ENCL: 01

SUB CODE: MT

NO REF SOV: 007

OTHER: 000

Card 2/3

ACCESSION NR: AP4017165

ENCLOSURE: 01

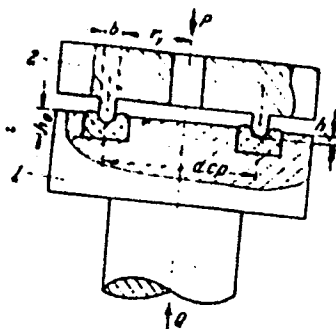


Fig. 1. Schematic of rubber-metal seal;  
1- rubber-metal detail; 2-seat.

Card 3/3



YUROVSKIY, V.S.; ARKHIPOV, A.M.; KOSENKOVA, A.S.; LEPETOV, V.A.; TSYBUK, B.S.

Methodology of accelerating the determination of warranted  
storage life of metal-rubber valves, Kauch.i rez. 23 no.11:  
10-13 N '64. (MIRA 18:4)

1. Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti.

KOSENKOVA, L.B. zootekhnik

Our experience in year-round raising of chickens. Ptitsévodstvo 9  
no.6:20-22 Je '59. (MIRA 12:10)

1. Kolkhoz imeni Kirova, Staromlinovskogo rayona, Stalinskoy  
oblasti.

(Poultry)

KOSENKOVA, Ye.I., vrach

Analysis of the incidence of stillbirth for eight years according to data from Maternity Home No.5 in Gorkiy. Sbor. nauch. rab.kaf. akush. i gin. GMI no.1:133-137 '60. (MIRA 15:4)

1. Rodil'nyy dom No.5 g. Gor'kogo, glavnyy vrach Shukin, M.M. (GORKIY--STILLBIRTH)

SOKHRINA, Raisa Fedorovna, nauchnyy sotrudnik; CHELPANOVA, Ol'ga Mikhaylovna, kand.geogr.nauk; SHAROVA, Valeriya Yakovlevna, kand.geogr.nauk. Prinimali uchastiye: RUBINSHTEYN, Ye.S., prof.; DROZDOV, O.A., prof., doktor geograf.nauk, red.; PRIK, Z.M.; PISAREVA, G.P., nauchnyy sotrudnik; GALINA, M.B.; KOSENKOVA, Z.D.; TIKHOMIROVA, N.A.; FEDOSEYEVA, G.N.; POKROVSKAYA, T.V., kand.geograf.nauk, red.; PISAREVSKAYA, V.D., red.; VOLKOV, N.V., tekhn.red.

[Air pressure, air temperature and atmospheric precipitation in the Northern Hemisphere] Davlenie vosdukha, temperatura vosdukha i atmosferynye osadki severnogo polushariia. Pod red. O.A.Drozdova i T.V.Pokrovskoi. Leningrad, Gidrometeor.izd-vo, 1959. 473 p. [Atlas of charts] Atlas kart. (MIRA 13:4)  
(Meteorology--Charts, diagrams, etc.)

KOSIŃSKI, R.

Young geodesists of the Warsaw Section of the Association of Polish Geodesists.

P. 124 (PRZEGŁAD GEODEZYJNY) Poland, Vol. 13, No.3, Mar. 1957

SO: Monthly Index of European Accessions (MEEI) Vol. 6, No. 11, November 1957

*Kosesnikov, S.M.*

USSR/General Biology. Genetics

B

Abs Jour : Ref Zhur-Biol., No 13, 1958, 57196

Author : Kosesnikov S. M.

Inst : Kishinev University

Title : On the Problem of the Nature of Heterosis of Interlineal Maize Hybrids

Orig Pub : Uch. zap. Kishinevsk. un-t, 1957, 23, 111,122

Abstract : The author's idea on the nature of the heterosis of interlineal maize hybrids named by him "New Phyloontogenetic Hypothesis" is presented. On the basis of this hypothesis "the specificity of the different quality gametes" of "intsukht-lines" of maize due to the phylogenetic depth in the differences of their separate indices and properties, and at the same time to what is apparently a nonstability, diffuseness, or non-

Card 1/2

36

Card 2/2

1. GRYN', F. O.; KOSETS', M. I.
2. USSR 600
4. Popov, M. G.
7. "Treatise on vegetation and flora of the Carpathian Mountains." M. G. Popov, Reviewed by F. O. Gryn', M. I. Kosets', Bot. zhur, 8, No. 1, 1951.

KOSYTS', M.I.

Survey of trees of the Lvov Province in the Ukrainian S.S.R. Bot. zhurn.  
[Ukr.] 10 no.4:75-85 '53. (MLRA 6:12)

1. Institut botaniki Akademii nauk Ukrains'koi RSR, viddil geobotaniki.  
(Lvov Province--Trees) (Trees--Lvov Province)

KOSETS, N.I.

Timber, line, scrubs and forests of creeping trees at high altitudes in the Soviet Carpathians. Bot. zhur. 47 no.7:957-969 J1 '62. (MIRA 15:9)

1. Institut botaniki AN UkrSSR, Kiyev.  
(Carpathian Mountains--Timber line)



K. OSEV, Khans Dim., inzh.

Work methods at the DIP "Stratsin", Sofia. Durvomebel prom. 5  
no.1:25-28 Ja-P '62.

KOSEV, K., inzh.

Nomogram for constructing external characteristics of carburetor engines. Mashinostoen 12 no.8:34-35 Ag '63.

KOSEV, Khans D., inzh.

High frequency bending of wood parts. Ratsionalizatsia 11 no.8:15-17  
'61.

1. Duzhavno industrialno predpriatie "Stratsin".

(Wood)

K'OSEV, Kh., inzh.

Liquid springs. Mashinostroene 13 no.12:39-40 D '64.

KOSEV, Dimitur, akad.

Paisii Khilendarski; his epoch and ideology. Spisanie BAN 7  
no. 3:3-17 '62.

1. Chlen na Redaktsionnata kolegiia, "Spisanie na Bulgarskata  
akademii na naukite".

L 24309-65

ACCESSION NR: AF5002981

S/C113/65/000/001/0005/0008

AUTHOR: Kosev, I. P.

TITLE: Nomographic calculations of velocity, external, and partial characteristics of four-stroke carburetor engines

SOURCE: Avtomobil'naya promyshlennost', no. 1, 1965, 5-8

TOPIC TAGS: carburetor, four stroke engine, fuel consumption, torque, nomograph

ABSTRACT: Four nomographs were prepared to allow for easy calculation of the four engine characteristics:  $N_x$ , the effective horsepower for a given engine r.p.m.,  $z_{ex}$ , the specific fuel consumption for a given r.p.m.,  $Q_x$ , the consumption per hour, and  $M_x$ , the engine torque. All four characteristics are represented in the parametric form  $F(k, \lambda)$ , where  $k = n_x/n_H$ ,  $\lambda = a_d/a_{d1}$ ;  $n_x, n_H$  - engine crankshaft r.p.m., corresponding to the power  $N_x$  and  $N_{max}$  respectively, and  $a_d/a_{d1}$  - degree of baffle plate opening in %. Orig. art. has: 5 formulas and 4 figures.

ASSOCIATION: NIPKIDT, Sofiya (Sophia)

Card 1/2

L 24109-65

ACCESSION NR: AP5002981

SUBMITTED: 00

ENCL: 00

SUB CODE: FR

NO REF SOV: 002

OTHER: 000

Card 2/2

E-2

COUNTRY : Bulgaria

CATEGORY :

17566

ABS. JOUR. : RZKhim., No. 5 1960, No.

AUTHOR : Kosev, N.

INST. : Not given

TITLE : The Determination of Barite Quality According to Bulgarian Standard BDS 679-51

ORIG. PUB. : Khimiya i Industriya (Bulgaria), 31, No 2, 57-59 (1959)

ABSTRACT : It has been established that the procedure prescribed by BDS 679-51 for the investigation of barite (refluxing the sample with 10% HCl) does not give precise results inasmuch as part of the Ba in the barite is present as BaCO<sub>3</sub>; in addition, the BaSO<sub>4</sub> is partly dissolved in HCl (the error in the analysis is 5-10%). The author recommends the determination of total Ba content in the barite by the fusion method, and the determination of BaSO<sub>4</sub> by refluxing a 0.3 gm sample with 50 ml 10%

CARD: 1/2

110

E-2

COUNTRY : Bulgaria

CATEGORY :

17566

ABS. JOUR. : RZKhim., No. 5 1960, No.

AUTHOR :

INST. :

TITLE :

ORIG. PUB. :

ABSTRACT : HCl for 30 min, followed by weighing of the undissolved residue.

N. Turkevich

CARD: 2/2



BOGDANOV, P.; DOBREV, D.; ~~KOSSEV, R.~~; [Kosev, R.]; PIRYOVA, B. [Piriiova, B].

A method of measuring the blood pressure of man in a water environment. Doklady BAN 17 no.1:93-95 '64

1. Chair of Anatomy and Physiology at the "Georgi Dimitrov" Higher Institute of Physical Culture, Sofia. Submitted by Academician D. Orakhevats, D.] [deceased].

KOSEV, Racho, d-r

Alcoholism. Biol i khim 7 no. 1: 9-16 '64.

KOSEV, S.; MLADENOV, V.; CHONEV, I.

Precast elements for earthquake-resistant apartment houses in  
Bulgaria. Bet.i zhel.-bet. no.8:381-383 Ag '61. (MIRA 14:8)  
(Bulgaria--Earthquakes and building)  
(Bulgaria--Precast concrete construction)

KOSEV, Simeon, Inzh.

Nomenclature of prepared ferroconcrete elements for the  
2-63 large-paneled houses. Stroitelstvo 11 no. 3:9-12  
My-Je '64.

KOSEVA, N.

Research on kaolin from the Stakhonov (Bozhidarski) mine and gray  
form Plevan. P. 19 LEKA PROMISHLENOST. (Ministerstwo na lekata i  
khranitelnata promishlenost) Sofia. Vol. 5, No. 4, 1956

SOURCE: East European Accessions List (EEAL) Library of Congress,  
Vol. 5, No. 11, November of 1956

KOSEVICH, H. A. M.

USSR

510.11  
 789. On the theory of magnetic permeability of  
 thin layers of metal at low temperatures. H. A. M.  
 KOSEVICH AND A. M. KOSYVICH. Dokl. Akad. Nauk  
 USSR, 91: No. 4, 1974, 1197-1199, 26 Refs. English  
 translation. J.S. National Sci. Found. NSF-156.  
 The magnetic moment of a thin layer of metal in a  
 magnetic field parallel to its plane is calculated (see  
 also Abstr. 950 5411 (1973)).

Phys-Tech Inst., Acad. Sci. Ukr SSR, Kharkov State Univ in Gor'kiy

ROSEVICH, A. E.

Dissertation: "Theory of Magnetic Susceptibility of Thin Layers of Metals at Low Temperatures." Cand Phys-Math Sci, Khar'kov State U, Khar'kov, 1954, Referatvnyy Zhurnal--Khimiya, Moscow, No 7, Apr 54.

SO: SUP 284, 26 Nov 1954

КОЗЕВИЧ, А.М.

On the Theory of Magnetic  
Susceptibility of Thin Layers  
of Metals at Low Temperatures

I. M. Lifshits, A. M. Kosevich

Dokl. Acad. Nauk  
21, 795-798  
1954

U.S.S.R.

The study of the periodic dependence of the magnetic susceptibility of metals on the magnetic field at low temperatures is extended to the dependence of this effect on the dimensions of the sample. A mathematical treatment is given which shows that when the radius of the orbit of the electrons in the magnetic field becomes of the order of the thickness of the metal layer the entire effect depends on the dimensions of the sample. As the dimensions decrease the magnetic moment (M) depends periodically on the value of the field (H) as well as on the dimensions. For very small fields the periodic dependence of M on H disappears. (Bibl. 15)  
(NSF Translation (156), 5pp., Jan., 1954, U.S.A.)



KOSEVICH, A. M.  
USSR/ Physics

Card : 1/1

Authors : Lifshits, I. M., and Kosevich, A. M.

Title : On the theory of the de Haas - van Alphen effect for particles with arbitrary law of dispersion

Periodical : Dokl. AN SSSR, 96, Ed. 5, 963 - 966, June 1954

Abstract : The periodical dependence of magnetic susceptibility upon the field at low temperatures (the de Haas - van Alphen effect) is observed for a large number of metals. The quantitative theory of this phenomenon was developed for electron gas with quadratic law of dispersion which is good only at the bottom of an energy level zone. The article analyzes conditions under which the quadratic dispersion mentioned above is good and it comes to the conclusion that such an assumption is without a reasonable base. Four references.

Institution : Acad. of Sc. Ukr-SSR, Physico-Techn. Institute

Presented by : Academician, L. D. Landau, March 15, 1954

LIFSHITS, I.M.; KOSEVICH, A.M.

Oscillations in the thermodynamic values for a degenerated Fermi-gas at low temperatures. Izv. AN SSSR.Ser.fiz.19 no.4:395-403  
Jl-Ag '55. (MIRA 9:1)  
(Low temperature research) (Electrons)

USSR/Physics - Magnetic susceptibility

FD-3243

Card 1/1            Pub. 146 - 2/44

Author            : Lifshits, I. M.; Kosevich, A. M.

Title             : Theory of magnetic susceptibility of metals at low temperatures

Periodical       : Zhur. eksp. i teor. fiz., 29, No 6(12), Dec 1955, 730-742

Abstract         : Studied are the magnetic properties of electrons in a metal in the case of an arbitrary law of dispersion. The authors find the energy levels of a quasiparticle with arbitrary law of dispersion in a magnetic field and calculate the magnetic moment of the gas of such quasiparticles taking into account spin paramagnetism. It is shown that the periods and amplitudes of oscillations are determined by the shape of the Fermi boundary surface. Knowledge of these quantities permit one to reproduce the shape of the Fermi surface and the values of the velocities on it. Eight references.

Institution      : Physicotechnical Institute, Academy of Sciences of Ukrainian SSR

Submitted        : July 17, 1954

USSR/Physics - Magnetism

FD-3244

Card 1/1            Pub. 146 - 3/44

Author            : Kosevich, A. M.; Lifshits, I. M.

Title             : The De Haas-Van Alphen effect in thin layers of metals

Periodical        : Zhur. eksp. i teor. fiz., 29, No 6(12), Dec 1955, 743-747

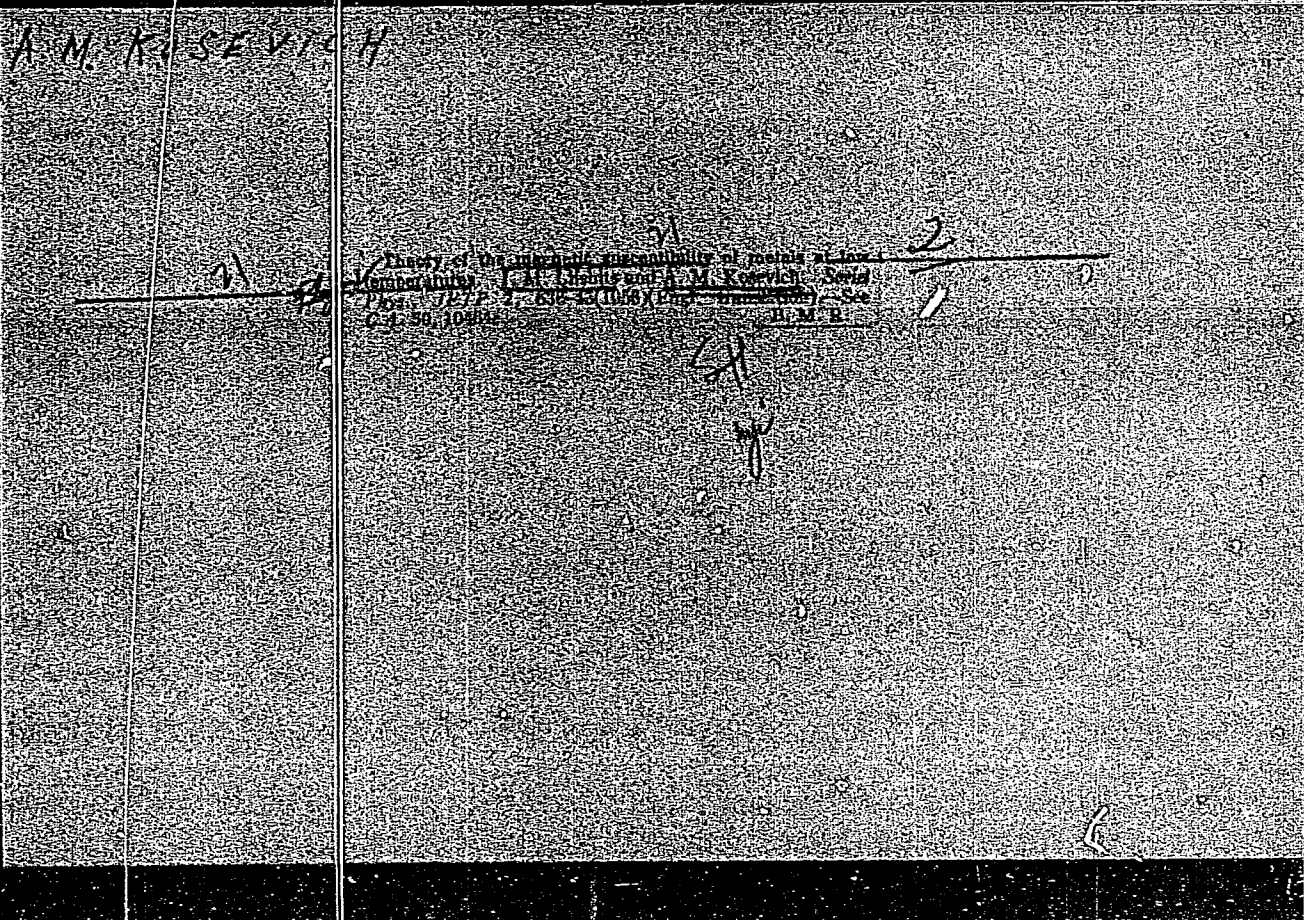
Abstract         : Considered are the magnetic properties of electrons in thin metal layers in the case of an arbitrary law of dispersion. The authors determine the energy levels of quasiparticle with arbitrary law of dispersion in a magnetic field in the presence of a perpendicular potential field. They calculate the oscillating part of the magnetic moment of the gas of such quasiparticles, and utilize the general formulas for an investigation of the De Haas-Van Alphen effect in thin layers of metals. It is shown that the periods and amplitudes of oscillations are determined by the shape of the Fermi boundary surface and depend essentially upon the ratio of the thickness of the layer and the "radius of the classical orbit" of the quasiparticle. Two references.

Institution      : Physicotechnical Institute, Academy of Sciences of Ukrainian SSR

Submitted        : July 19, 1954

KOSEVICH, A. M., LIFSHITS, I. M., and POGORELOV, A. V. (Khar'kov)

"The Energy spectrum of Electrons in Metals and the De-Haas-van Alphen Effect,"  
a paper submitted at the International Conference on Physics of Magnetic Phenomena,  
Sverdlovsk, 23-31 May 56.



KOSEVICH, A.M.

~~Quasi-classic quantization in the magnetic field.~~ Ukr. fiz.  
shur. 1 no.3:261-264 J1-S '56. (MLRA 9:12)

1. Chernivets'kiy derzhavnyi universitet.  
(Magnetic fields) (Quantum theory)

KOSEVICH, A.M.

Oscillations of magnetic magnitudes of degenerated electron  
gases in a parabolic potential well. Ukr. fiz. zhur. 1 no.4:  
339-346 0-D '56. (MLRA 10:2)

1. Chernivets'kiy derzhuniversitet.  
(Electrons) (Metals at low temperatures)



ROSEWICH, A.M.

197-311.91 - 197-311.9  
 197-311.91 - 197-311.9  
 ON THE THEORY OF THE SHUBNIKOV-DE HAAS  
 EFFECT  
 L.M. ILLIANSKIY and A.M. ROSEWICH  
 Zh. eksper. teor. fiz., Vol. 77, No. 1 (7), 195-100 (1987). In Russian.  
 Quantum oscillations of the electrical conductivity ( $\sigma_{xx}$ ) and  
 specific resistance ( $\rho_{xx}$ ) tensors in metals are investigated on the  
 basis of some earlier general formulas. It is shown that oscillations  
 of  $\sigma_{xx}$  and  $\rho_{xx}$  may be expressed in terms of the magnetic moment  
 oscillations in the de Haas-van Alphen effect and in terms of the  
 classical values of the mobility tensor. The asymptotic values of  
 the oscillation amplitudes in strong magnetic fields are investigated  
 and some simple cases are considered for which calculation of the  
 oscillation amplitudes may be carried out completely.

3

of

K O S E V I C H, H. M.

56-3-27/59

AUTHOR: Kosevich, A.M.

TITLE: The De Haas-van Alphen Effect in a Varying Magnetic Field.  
(Effekt de Gaaza - van Al'fena v peremennom magnitnom pole)

PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol. 33, Nr 3,  
pp. 735-745 (USSR)

ABSTRACT: Following problems are theoretically studied and solved for low temperatures:

- 1) Oscillation of the magnetic moment of a metal assay in an impulse field (quantitative treatment)
- 2) The case  $l \ll R$ . The oscillation part of the magnetic moment of a plane metal assay.
- 3) The case  $l \gtrsim R$ . A cylindrical assay in an impulse field:
  - a) impulses of long duration:  $l \gtrsim R (\alpha/H)^{1/2}$
  - b) short impulses:  $l \gtrsim R \gg l(H/\alpha)^{1/2}$

In the first chapter there is explained that the oscillation properties of the magnetic moment of a metal assay in an impulse field depend to a great extent on the proportions between the penetration of the magnetic field into the assay and the size of the assay itself. In the chapters 2 and 3 the formulae for the oscillating part of the magnetic moment are derived under different conditions. There are 1 figure and 2 Slavic references.

Card 1/2

APPROVED FOR RELEASE: 06/14/2000

CIA-RDP86-00513R000825110002-2"

The de Haas van Alphen Effect in a Varying Magnetic Field. 56-3-27/59

ASSOCIATION: Chernovtsy State University (Chernovitskiy gosudarstvennyy universitet)

SUBMITTED: March 16, 1957.

AVAILABLE: Library of Congress

Card 2/2

K O S E V I C H, H. M.

56-7-14/66

CARD 2/2

On the Theory of the SHUBNIKOV-DE HAAS-Effect.

56-7-14/66

$\Delta \sigma^{\alpha\beta}$ . The contribution of each zone is connected with  $\Delta M^z$  only at a corresponding electron group. Also some remarks are made concerning the amplitudes of the oscillations  $\Delta \sigma^{\alpha\beta}$ .

The asymptotics of the oscillations of the conductivity in strong magnetic fields. In this case amplitudes can be developed asymptotically in a power series. The asymptotic is here written down also for the special case that FERMI'S boundary surface disintegrates into some closed surfaces. The oscillations of the resistance: When experiments are carried out, not the tensor of the electrical conductivity  $\sigma^{\alpha\beta}$  but the tensor of the specific resistance is measured. Therefore the oscillatory share of  $Q^{\alpha\beta}$  has to be determined. The connection between  $\sigma^{\alpha\beta}$  and  $Q^{\alpha\beta}$  is given here. The expression for  $\Delta Q^{\alpha\beta}$  contains classical values and oscillatory shares. In conclusion the oscillations for some concrete cases are computed (one zone of conductivity and two zones with  $N^+ = N^-$ ). (No Illustrations)

ASSOCIATION: Physical-Technical Institute of the Academy of Sciences of the Ukrainian S.S.R. (Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR.)

APPROVED FOR RELEASE: 06/14/2000

CIA-RDP86-00513R000825110002-2"

SUBMITTED: 22.11.1956  
AVAILABLE: Library of Congress.

ROSEVICH, A.M.

PALATNIN, L. S., KOSEVICH, A. M.

University Polytechnical Institute, Kharkov,

"The Investigation of Diffusive and Undiffusive Transformation of  
Amorphous Antimony Films."  
Paper submitted at

Program of the Conference on the Non-Metallic Solids of Mechanical Properties, Leningrad  
May 19 - 26, 1958

AUTHOR: Kosevich, A. M. SOV/56-35-1-34/59

TITLE: On the Influence of Deformation on Oscillation Effects in Metals at Low Temperatures (O vliyani deformatsiy na ostsillyatsionnyye efekty v metallakh pri nizkikh temperaturakh)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 35, Nr 1, pp. 249-253 (USSR)

ABSTRACT: In the course of recent years a number of experimental papers has been published which deal with the influence exercised by elastic deformation in metals on certain physical phenomena which are connected with the character of the energy spectrum of the conductive electrons (Refs 1 - 4). Proceeding from the semiphenomenological calculation of the influence exercised by an elastic deformation upon the electron spectrum, the present paper investigates several effects occurring in the deformation of metals. Investigations are based on the assumption that the influence exercised by elastic deformation upon dispersion can be taken into account in form of a small admixture to the electron energy in the undeformed metal (cf. Akhiezer et al., Ref 5):

Card 1/3

On the Influence of Deformation on Oscillation  
Effects in Metals at Low Temperatures

SOV/56-35-1-34/59

$$\xi^{\alpha}(\vec{p}) = \xi_0^{\alpha}(\vec{p}) + \xi_{ik}^{\alpha}(\vec{p}) u_{ik}$$

Here  $\xi^{\alpha}(\vec{p})$  and  $\xi_0^{\alpha}(\vec{p})$  denote the energy of the electrons of the  $\alpha$ -the group in the deformed and undeformed metal respectively,  $u_{ik}$  denotes the tensor of deformation and  $\xi_{ik}^{\alpha}(\vec{p})$  characterizes the given groups of the tensor function of the quasimomentum  $\vec{p}$ . In the following the influence exercised by elastic deformation upon the properties of the electron gas in the metal is investigated and it is shown that, if electron groups with essentially different electron numbers are present in the metal, the de Haas - van Alphen (de Gaaz - van Al'fen) effect is very sensitive with respect to metal deformations. The fluctuations of the thermodynamical quantities of the metal, which are caused in a constant magnetic field by modifications of external pressure, are finally discussed. The author thanks I.M. Lifshits for his advice and discussions, and B.I. Verkin and I.M. Dmitrenko for discussing the results obtained.

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On the Influence of Deformation on Oscillation  
Effects in Metals at Low Temperatures

SOV/56-35-1-34/59

There are 9 references, 3 of which are Soviet.

ASSOCIATION: Fiziko-tehnicheskiy institut Akademii nauk Ukrainskoy SSR  
(Physico-Technical Institute, AS UkrSSR)

SUBMITTED: February 26, 1959

Card 3/3

SOV/56-35-3-26/61

24(3)

AUTHOR:

Kosevich, A. M.

TITLE:

The De Haas - Van Alphen Effect in Pulsed Magnetic Fields  
(Effekt de Gauza - van Al'fena v impul'snykh magnitnykh polyakh)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958,  
Vol 35, Nr 3, pp 738-741 (USSR)

ABSTRACT:

In a previous paper (Ref 1) the author already spoke about investigations carried out of the de Haas - van Alphen (de Gaaz - van Al'fen) effect in slowly varying magnetic fields and investigated the question as to when it is possible to proceed from formulae for the quantization of the motion of electrons; together with Lifshits (Ref 2) the magnetic moment of the electron gas in homogeneous magnetic fields was calculated. In the present paper the author investigates the quantization equations in an inhomogeneous magnetic field the gradient of which is vertical to the direction of the field, as well as the part played by the inhomogeneity of the field when the de Haas - van Alphen effect is dealt with by means of the impulse method. The author bases on the assumption that for particles with the charge  $e$  any law of dispersion  $E = E(p_x, p_y, p_z)$  applies in the

Card 1/3



SOV/56-35-3-26/61

The De Haas - Van Alphen Effect in Pulsed Magnetic Fields

$\vec{H}$ -field, that grad H coincides with the y-axis, and that for the impulse components it holds that

$$p_x = \frac{e}{c} \int_{y_0(p_x)}^y H(y) dy, \quad p_y = p_y \quad \text{and} \quad p_z = p_z; \quad \text{for the function } y_0(p_x) \text{ it applies that } p_x = -\frac{e}{c} \int_0^{y_0(p_x)} H(y) dy; \text{ for quantization}$$

the operator relation  $[\hat{p}_y, \hat{p}_x] = \frac{e}{c} H(y)$ ,  $[\hat{p}_x, \hat{p}_z] = [\hat{p}_y, \hat{p}_z] = 0$  is used, where  $y = y(p_x, p_x)$ , with the condition for quasi-classical quantization:  $\oint [\hat{p}_y / H(y)] dp_x = (n + \gamma) eh/c; \quad (0 < \gamma < 1)$ .

In the second part of the paper the author, without any explicit mathematical deliberations, investigates the question to what extent the de Haas - van Alphen effect can be used in a pulsed magnetic field for the investigation of the Fermi surface of the electron gas in a metal. In conclusion, he thanks I. M. Lifshits and M. Ya. Azbel' for discussions. There are 6 references, 5 of which are Soviet.

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SOV/56-35-3-26/61

The De Haas - Van Alphen Effect in Pulsed Magnetic Fields

ASSOCIATION: Fiziko-tehnicheskiy institut Akademii nauk Ukrainskoy SSR  
(Physico-Technical Institute, AS Ukrainskaya SSR)

SUBMITTED: April 7, 1958

Card 3/3

SOV/126-8-2-15/26

AUTHORS: Kosevich, A.M. and Tanatarov, L.V.

TITLE: Deformation of a Flat Specimen of a Solid in Phase Transformation

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 2, pp 255 - 267 (USSR)

ABSTRACT: Recently, several experimental researches have appeared devoted to the change in shape of solid specimens in allotropic transformation. The multiplicity of factors controlling the effects has made theoretical treatment difficult. The present authors attempt to evaluate the deformation of a flat solid specimen on the basis of a purely macroscopic examination of mechanical stresses and deformations due to changes in the specific volume. They formulæ conditions in terms of an isotropic solid layer, assuming temperature stresses are comparatively insignificant, Figure 1 showing the arrangement of the phase boundaries. The boundary conditions are determined and general equations deduced. Deformation and displacements are analysed on the basis of the equations

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SOV/126-8-2-15/26

Deformation of a Flat Specimen of a Solid in Phase Transformations

deduced. The authors next consider residual deformations and stresses in the specimens; Figure 2 shows the relation of the stress and deformation in the new phase. After a discussion of residual deformations and stresses in the reverse phase transformation, the authors go on to examine phase transformations with large specific-value changes. Figure 3 shows the relation of stress on deformation. There are 4 figures and 4 Soviet references.

ASSOCIATION: Fiziko-tekhnicheskii institut AN UkrSSR  
(Physico-technical Institute of the Ac.Sc., Ukrainian SSR)

SUBMITTED: June 25, 1958

Card 2/2



Ko S E. V. H. A. M.

report presented at the 1st All-Union Congress of Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb '60.

1. A. A. Abkhazov, A. E. Krasov, L. A. Shvarts (Mosc): Superconductivity of viscoplastic solids and the basis for improving soil consolidation.
2. A. A. Abkhazov, V. A. Mikhlin, A. A. Mironov (Mosc): Heat transfer in working viscous and viscoplastic solids.
3. E. L. Abramson (Novosib): Torsion of cylindrical shafts.
4. L. Abramson, A. A. Mikhlin (Novosib): Torsion of circular hollow shafts with longitudinal notches.
5. L. L. Anisimov, A. E. Volter, V. A. Mikhlin (Novosib): Buckling and post-buckling behavior of shells under dynamic loading.
6. A. L. Aleksandrov (Novosibirsk): Some relations between the stiffness of plates and asymptotical problems in the theory of elasticity.
7. A. L. Aleksandrov (Novosibirsk): Experimental investigation of some stability problems of rods of periodic structure.
8. V. K. Alshitskiy, D. A. Sokolov (Gosenergom): Some contact problems in elasticity.
9. E. A. Alimovskiy, E. D. Aronimov, K. E. Mikhlin (Novosib): Motion of particles near under transient creep.
10. A. A. Alshitskiy (Novosib): Two-dimensional bodies of equal strength.
11. E. A. Alshitskiy (Novosib): Asymptotical vibration of an elastic shell of finite length.
12. E. A. Alshitskiy (Novosib): On the theory of anisotropic shells and plates.
13. E. A. Alshitskiy, L. A. Krasovskiy (Novosib): Some problems in the theory of anisotropic (orthotropic) shells.
14. Z. L. Anis (Novosib): Stability analysis of a stiffened cylindrical shell under axial compression.
15. V. I. Anisimov, A. E. Volter, A. E. Mikhlin (Novosib): The stability of a shell of finite length in a plane layer of a solid under anisotropic three-dimensional loading.
16. L. A. Anisimov (Novosib): The stress distribution in a heavy shell of finite length under the action of a uniform load.
17. E. Aronimov, K. E. Mikhlin (Novosib): Pseudostatic model of a shell of finite length.
18. E. D. Aronimov (Novosib): The plane contact problem of the theory of creep.
19. Z. V. Aronimov, V. I. Anisimov, A. E. Mikhlin (Novosib): Some problems and limits of reversible strains of solids and gels of some rubbers.
20. E. A. Anisimov (Novosib): The general solution of the problem of elastic vibration of a cylinder of finite length.
21. A. E. Aronimov (Novosib): The theory of equilibrium cracks under finite deformations.
22. A. E. Aronimov (Novosib): Rheological properties of rubber-like polymers.
23. E. A. Aronimov (Novosib): Dynamic design of structures subjected to finite deformations.
24. E. A. Aronimov (Novosib): Temperature distribution in structures under axial loading.
25. E. A. Aronimov (Novosib): On the dynamics of rigid-plastic structures.
26. E. A. Aronimov (Novosib): The theory of the limit state of stress in soil mechanics and its applications.
27. E. A. Aronimov, A. E. Volter (Novosib): The use of abstracts of digital computers for solving non-linear problems in the theory of plates and shells.
28. V. I. Aronimov (Novosib): Stress displacement functions.
29. V. A. Aronimov (Novosib): Difference-variational methods of the theory of structures.
30. V. I. Aronimov (Novosib): On solving Kirchhoff's contact problem with layered fields of plasticity.
31. V. I. Aronimov (Novosib): Method of space transformations in the non-linear theory of plates and shells.
32. V. I. Aronimov (Novosib): The non-linear problems of asymptotic stability at supercritical speeds.
33. V. I. Aronimov (Novosib): Strength and design under action of random forces.
34. V. I. Aronimov (Novosib): The statistical theory of seismic design of structures.

S/181/60/002/012/004/018  
B006/B063AUTHORS: Kosevich, A. M. and Tanatarov, L. V.

TITLE: Production of Cavities in Solids by Local Melting

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 12, pp. 3012-3016

TEXT: The process of local melting, i.e., the local evolution of heat in a solid has been studied, and the plastic deformation due to different specific volumes of the liquid and solid phases of the substance has been theoretically analyzed. The body used for the purpose had a liquid phase with a greater specific volume than that of the solid phase. The relative increase of the linear dimensions  $\epsilon_0$  was very large compared to the deformation  $e_s$  on the elastic boundary of the material near the melting point:  $\epsilon_0 \gg e_s$  (in general,  $\epsilon_0/e_s \sim 10 - 10^2$ ). The pressure of liquid-phase melting is given by  $p_m = \frac{2}{3} \sigma_s [1 + \ln(a/r_m)^3]$ , where  $a$  is the radius of the zone of plastic deformation, and  $(a/r_m)^3 \sim \epsilon_0/e_s$ . For

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Production of Cavities in Solids by  
Local Melting

S/181/60/002/012/004/018  
B006/B063

$\epsilon_0/e_s \sim 10^2$ ,  $p_m$  is approximately  $3\sigma_s$ ; the compression of the liquid is  $3kp_m \sim 3k\sigma_s \sim 3e_s$  ( $k$  - compression coefficient). This pressure causes a plastic deformation of the solid. The liquid fills up the "excess" volume ( $4\pi\epsilon_0 r_m^3$ ), from which the solid phase was displaced during the melting process, on account of the increase of the specific volume. When the liquid solidifies, the radius  $r$  of the liquid phase decreases, and part of the "excess" volume ( $\sim r_m^2(r_m - r_0)\epsilon_0$ ) becomes free. The high absolute negative pressures that accompany this process lead to the formation of cavities. If the pressure has the absolute value  $p$  and  $\alpha$  is the coefficient of surface tension of the liquid, then the radius  $q$  of the cavity is  $\sim \alpha/p$ . This negative pressure may be proportional to  $\sigma_s$  so that  $q \sim \alpha/\sigma_s$  holds. Hence,  $q$  is  $10^{-6} - 10^{-5}$  cm for usual solids. An estimate of the least amount of heat  $Q$  required for the formation of a cavity gives  $Q \sim cT_0 V$ ;  $c$  is the specific heat;  $T_0$  is the melting temperature; and  $V \sim q^3/kp \sim \alpha^3/k\sigma_s^4$  ( $V \sim 10^{-16} - 10^{-12}$  cm). Thus, one obtains  $Q \sim 10^{-6} - 10^{-2}$  J. I. M. Lifshits

Card 2/3



KOSEVICH, A.M.

27947

S/185/60/005/004/006/021  
D274/D306

24 5400

1043 1555 1327

AUTHORS: Kosevych, A.M., Andryeyev, V.V. and Tanatarov, L.V.

TITLE: Inelastic deformation and residual strains of a flat solid layer under polymorphic transformation

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 5, no. 4, 1960, 479-485

TEXT: An infinite isotropic layer is considered which has two phases (I and II) with different physical properties (in particular, with different specific volumes, whereby  $\Delta V/V = 3\epsilon_0$ ). If the surface temperature of the phase-I layer reaches the value of polymorphic-transformation temperature (transition from solid phase I to solid phase II) or exceeds it, then the phase-II layer is formed. Assuming that at the phase boundary the infinitely thin, deformed, phase-I layer passes into phase-II which remains attached to the phase-I layer, then, owing to the different specific volumes of the phases, a stress-strain state of the specimen as a whole arises;

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D274/D306

Inelastic deformation...

this state changes with time in accordance with phase-boundary displacements. The case is investigated when the relative change in volume of the body due to phase transformation exceeds the deformations corresponding to the elastic-limits of the phases. Such a problem is encountered in considering mechanical processes in solids which take place at cyclical temperature regimes, the surface temperature passing repeatedly through the polymorphic-transformation point. The problem was dealt with, where the observed effect was entirely due to plastic deformations, while neglecting relaxation stresses, by two of the authors (Ref. 2: A.M. Kosevych, L.V. Tanatarov, Fizika metallov i metallovedeniye, 8, 225, 1959). In the present article, the relaxation processes are taken into account. The hysteresis character of the plastic deformations, as well as the relaxation stresses, lead to residual strains in the specimen (after it passed into the new phase). These residual strains cause irreversible changes in shape of the specimen. The principal assumptions and equations are similar (in the present article) with those of Ref. 2 (Op. cit), but the results differ substantially,

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Inelastic deformation...

since the relaxation stresses involve the dependence of the residual strains on the rate of motion of the boundary phases, i.e. on the heating and cooling temperatures. Two cases are considered: a) the relaxation time  $\tau$  is large as compared to the phase transition time  $T$ ; b)  $\tau$  is smaller than  $2T$ . Case a) A system of differential equations is set up for the stress tensor  $\sigma$ . These equations are solved by the method of successive approximations, after expanding in terms of the small parameter  $T/\tau$ . The residual strain is given, in the first approximation, by

$$u_2^1(T) = \frac{1}{ah\tau} e^{F(T)} \int_0^T q(t) e^{-F(t)} dt, \tag{12}$$

where

$$q(t) = \left[ 1 - \frac{\psi_1'(\epsilon_0 - u_0(t))}{\alpha} \right] x_0(t) \psi_1(\epsilon_0 - u_0(t)) - \frac{1}{\alpha} \int_0^t \psi_1(\epsilon_0 - u_0(t_j)) dt \frac{d}{dt} [x_0(t) \psi_1'(\epsilon_0 - u_0(t))], \tag{13}$$

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D274/D306

Inelastic deformation...

u being the strain tensor,  $\psi$  being related to plastic deformations; for the residual strain, inequality

$$0 < u_2^r(T) < 2 \frac{\psi_1(\epsilon_0)}{\alpha} \left( \frac{T}{\tau} \right) e^{F(T)}. \quad (14)$$

holds, where  $F(T) \sim 1$  if  $\epsilon_0 \sim \epsilon_s$  ( $\epsilon_s$  being the strain at the elastic limit). From these formulas it follows that the relaxation can only increase the residual strain during one-directional phase-transitions, that the residual strain depends on the velocity of the boundary phases and on T, and that in a cyclical process I  $\rightarrow$  II  $\rightarrow$  I the residual strain depends in magnitude as well as in sign, on the heating and cooling temperatures. Case b) By assuming  $\epsilon_0 \gg \epsilon_s$ , the calculations are considerably simplified. For  $\tau < 2T$ , the deformation of the specimen is given by

$$u_2(t) = \epsilon_0 + \epsilon_s \left\{ 1 + \frac{t}{\tau} - \exp \left( 1 - \frac{t}{\tau} - \frac{x_0(t)}{h} \right) \right\} \quad (19)$$

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D274/D306

Inelastic deformation...

$$-\left(\frac{1}{\tau}\right) \int_0^t \left[ \exp\left(1 - \frac{z}{\tau} - \frac{x_0(z)}{h}\right) + \exp\left(\frac{z-t}{\tau} + \frac{x_0(z) - x_0(t)}{h}\right) \right] dz -$$

$$-\left(\frac{1}{\tau^2}\right) \int_0^t dz \int_0^t dy \exp\left(\frac{z-y}{\tau} + \frac{x_0(z) - x_0(y)}{h}\right) \quad (19)$$

for  $t = T$ , this equation yields an expression for the residual strain after a I  $\rightarrow$  II transition. For  $\tau \leq 2T$ , the same conclusions apply to the residual strains as in case a). For  $\tau \ll T$ , the following conclusion applies: if  $T_1 > T_2$  ( $T_1$  being the "standstill" time in the I  $\rightarrow$  II transition, and  $T_2$  - that of the II  $\rightarrow$  I transition), then the total residual strain is positive, i.e. the size of the layer increases. For  $T_1 < T_2$  (under fast heating and slow cooling), the size of the layer decreases. These qualitative results are in agreement with experimental results (Ref. 4: S.F. Kovtun, Fizika metallov i metallovedeniye, 8, 941, 1959). There are 4 Soviet-bloc references.

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Inelastic deformation...

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D274/D306

ASSOCIATION: Fizyko-tekhnichnyy instytut AN USSR (Physico-technical Institute AS UkrSSR)

SUBMITTED: December 23, 1959

X

Card 6/6

KOSEVICH, A.M.; ANDREYEV, V.V.

Quantum analog of the collision integral for electrons in  
magnetic and electric fields. Zhur.eksp.i teor.fiz. 15  
no.3:882-888 Mr '60. (MIRA 13:7)

1. Fiziko-tekhnicheskij institut Akademii nauk Ukrainskoy  
SSR.

(Electrons) (Collisions(Nuclear physics))

S/040/60/024/005/006/028  
C111/C222

11.2300

AUTHORS: Kosevich, A.M., and Tanatarov, L.V. (Khar'kov)

TITLE: Plactical Deformation and Irreversible Changes in a Solid Body for a Local Melt. Punctiform Heat Source

PERIODICAL: Prikladnaya matematika i mekhanika, 1960, Vol.24, No.5, pp. 843-851

TEXT: A local melt means the melting of a small spot of a solid body which appears if in a small spot of the body a certain quantity of heat becomes free very quickly. The authors consider the plactical deformation caused by the difference of the specific volumes of the solid and the fluid state of aggregation. It is shown that during the hardening of the melted spot in the fluid there may appear a very high negative pressure which may involve a rupture of the fluid and finally an appearance of cavities in the hardened body. Here it is assumed that the heat becomes free instantaneously, that the body initially was isotropic, that the specific volume of the fluid state of aggregation is greater than that of the solid one, that the relative enlargement  $\epsilon_0$  of the linear measures during the melting is greater than the deformation on the boundary of elasticity so that around the melted

X

Card 1/2



83770

S/056/60/039/003/026/045  
B006/B063

26.1410  
24.2120  
AUTHORS:

Andreyev, V. V., Kosevich, A. M.

TITLE:

Quantum Oscillations of the Coefficient of Thermal  
Conductivity of an Electron Gas in a Magnetic Field

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,  
Vol. 39, No. 3(9), pp. 741-745

TEXT: At low temperatures, the thermal conductivity of metals in a mag-  
netic field shows a special feature that is similar to the Shubnikov -  
de Haas effect. The electronic part of the thermal conductivity of metals  
is held responsible for the oscillations of thermal conductivity ob-  
served in the magnetic field; a theoretical investigation of the quantum  
oscillations of this electronic part was the aim of the authors. The  
present paper describes a study of quantum corrections to the classical  
coefficient of thermal conductivity (which is a smooth function of the  
magnetic field) within the framework of the free conduction electron gas  
model. The thermal distribution of this electron gas is supposed to have  
a slight, constant gradient ( $\text{grad } T$ ) perpendicular to the outer homogeneous

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Quantum Oscillations of the Coefficient of Thermal Conductivity of an Electron Gas in a Magnetic Field

S/056/60/039/003/026/045

B006/B063

H-field. The electron density is assumed to be so high that

$\theta \equiv kT \ll \xi$  and  $\hbar\omega \ll \xi$  ( $\xi$  - chemical potential of the electron gas,  $\omega = eH/mc$ ). Under these conditions the problem can be treated in a quasi-classical approximation. Only the scattering of electrons by impurities is considered in the calculation of kinetic coefficients, and the impurity concentration is supposed to be low. In the course of time a steady state will appear, for whose relaxation time  $\tau$  the condition  $\omega\tau \gg 1$  is assumed to hold. The two conditions  $\hbar\omega \ll \xi$  and  $\omega\tau \gg 1$  are easily satisfied at the same time for metals at low temperatures. The quantities  $1/\omega\tau$  and  $\hbar\omega/\xi$  are the small parameters which are expanded in a power series. The state of the electron gas found when considering the scattering of electrons by impurities is described by the statistical single-particle parameter  $q$  (cf. previous paper by the authors, Ref. 3). The method described here for expanding the kinetic coefficients in a power series of the small parameters permits studying the thermal conductivity of an electron gas following an arbitrary dispersion law. For reasons of simplicity, however, an isotropic quadratic dispersion law is assumed here. It is found that the oscillating part of the coefficient

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Quantum Oscillations of the Coefficient of Thermal Conductivity of an Electron Gas in a Magnetic Field S/056/60/039/003/026/045 B006/B063

of thermal conductivity  $\kappa$  may be expressed in a simple manner by the oscillations of the specific electrical conductivity  $\sigma$ . Then, one obtains:

$$\pi^2 H^2 \frac{\partial^2}{\partial H^2} \left( \frac{\Delta \kappa}{\kappa_0} \right) = 3 \int_0(0)^2 \frac{\partial^2}{\partial \theta^2} \left( \frac{\Delta \sigma}{\sigma_0} \right), \text{ where } \int_0(0) \text{ is the classical chemical}$$

zero potential.  $H \frac{\partial}{\partial H} \Delta \kappa \sim \frac{\int_0}{\hbar \omega} \Delta \kappa$  and  $\int_0 \frac{\partial}{\partial \theta} \Delta \sigma \sim \frac{\int_0}{\hbar \omega} \Delta \sigma$  hold so that one obtains  $\Delta \kappa / \kappa_0 \sim \Delta \sigma / \sigma_0$ . At moderately low temperatures ( $\hbar \omega < \varrho$ ),

$\Delta \kappa / \kappa = 3(\Delta \sigma / \sigma_0)$  holds. The authors thank I. M. Lifshits and M. Ya. Azbel' for discussions. V. G. Skobov is mentioned. There are 7 references: 5 Soviet and 2 US. ✓

ASSOCIATION: Fiziko-tekhnicheskii institut Akademii nauk Ukrainskoy SSR  
(Institute of Physics and Technology of the Academy of Sciences Ukrainskaya SSR)

SUBMITTED: April 9, 1960

Card 3/3

31249

S/207/61/000/005/008/035  
D237/D303

11.2320

AUTHORS: Kosevich, A.M., and Tanatarov, L.V. (Khar'kov)

TITLE: Plastic deformation and irreversible changes in a solid at local melting. Thread-shaped source of heat

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 5, 1961, 61 - 66

TEXT: This is a continuation of the authors' former work (Ref. 1: PMM. vol. XXIV. no. 5) which dealt with a point heat source. Here, a solid isotropic, incompressible, infinite circular cylinder (of a radius R) is considered, along whose axis an amount of heat is momentarily emitted, sufficient to melt the immediate surroundings. Deformation of the solid on melting is considered first. Stress ( $\sigma_{ik}$ ) and strain ( $U_{ik}$ ) tensors are used to arrive at the formula for the intensity of deformation which is

$$J = \frac{\sqrt{2}}{3\sqrt{3}} V(\epsilon_r - \epsilon_\varphi)^2 + (\epsilon_r - \epsilon_z)^2 + (\epsilon_\varphi - \epsilon_z)^2 = V \frac{1}{3} u^2 + \epsilon_0^2 (r_0/r)^4 \quad (1.5) \quad X$$

Card 1/2

Plastic deformation and ...

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S/207/61/000/005/008/015  
D237/D303

and the pressure in the liquid phase is found to be

$$p = \frac{3}{2} \sigma_s \left\{ 1 + \ln \left( \frac{\epsilon_0}{\epsilon_s} \right) \right\}, \quad (1.12)$$

analogical to (1.14) in Ref. 1 (Op.cit.). Deformation of the solid on solidification of the liquid phase is discussed and equations of state during freezing are given as well as formulae for the pressure with various boundary conditions, and the conclusion of Ref. 1 (Op.cit.) is confirmed that solidification results in numerically large negative pressure in the liquid, with subsequent formation of cavities. Some minimal values necessary for the cavitation to begin, are given. I.M. Lifshits is mentioned for his fruitful discussions. There are 4 Soviet-bloc references.

SUBMITTED: May 7, 1960

Card 2/2

X

S/207/6000/005/009/015  
D237/D303

AUTHORS: Andreyev, V.V., Kosevich, A.M., and Tanatarov, L.V.  
(Khar'kov)

TITLE: Deformation of a rod of circular cross-section in  
phase transition

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki,  
no. 5, 1961, 67 - 70

TEXT: An incompressible cylindrical solid is considered and the phase transition is solid 1  $\rightarrow$  solid 2, their specific volumes differing from each other. The authors show that the equations describing the deformation of the cylinder are formally identical to those derived for the case of flat plate in (Ref. 1: Fizika metallov i metallovedeniye, 1959, 8, p. 255). If the surface temperature of the cylinder is equal or higher than the transition temperature, the boundary moves inwards and can be represented by a cylindrical surface. The velocity of the boundary is assumed to be known and mechanical stresses and strains are considered. The func-  
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Deformation of a rod of circular ...

S/207/61/000/005/009/015  
D237/D303

tion  $v(r) = u_{zz}^{(2)}$  where  $u_{ik}$  represents the element of strain tensor  
is shown to describe final deformations, and it is pointed out  
that if mechanical properties of two phases differ from each other,  
there is a residual deformation after the full cycle  $1 \rightarrow 2 \rightarrow 1$ .  
There are 3 Soviet-bloc references.

SUBMITTED: December 28, 1960

Card 2/2

KOSEVICH, A.M.; PASTUR, L.A.

Dislocation pattern of a twin. Fiz.tver.tela 3 no.4:1290-1297  
Ap '61. (MIRA 14:4)

1. Fiziko-tekhnicheskiy institut AN USSR i Khar'kovskiy politekhnicheskiy institut.  
(Dislocations in crystals)



KOSEVICH, A.M.; PASTUR, L.A.

Shape of a thin twin situated at an angle to the surface.  
Fiz. tver. tela 3 no.6:1871-1875 Je '61. (MIRA 14:7)

1. Fiziko-tekhnicheskiy institut AN USSR i Khar'kovskiy  
politekhniicheskiy institut, Khar'kov.  
(Crystal lattices)

24.1500 (1144, 1454)

161/61/003/011/003/056  
B102/B138

AUTHOR: Kosevich, A. M.

TITLE: Dislocation theory of hysteresis effects during twinning and shearing in an unbounded medium

PERIODICAL: Fizika tverdogo tela, v. 3, no. 11, 1961, 3263 - 3271

TEXT: The author considers the hysteresis effects which occur during twinning and shear formation in an infinite crystal. The crystal is assumed to be exposed to an external stress which changes infinitely slowly but monotonically with time. A very simple isotropic model with equilibrium dislocation distribution is chosen. First the two-dimensional problem of twin formation under the action of an external monotonically growing stress is considered. The trace of the axis of the dislocation source coincides with the beginning of the planes of Cartesian coordinates  $xoy$ ,  $x$  coincides with the trace of the twinning plane. The dislocation

density  $\rho$  along  $x$  is defined by  $\int_a^b \frac{\rho(\xi) d\xi}{\xi - x} = f(x) + S'(x)$ ;  $x = a$  and

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$x = b$  are the ends of the twin,  $f(x)$  is the force acting on the dislocations due to the external load and  $S(x)$  is the decelerating force which consists of two different components: a friction component,  $S(x) = -S_0$ , and a surface-tension component,  $S_\eta(x) = P(b - x)$ ;  $P(x)$  decreases monotonically with increasing argument from  $S_\eta^0$  to zero in the small interval  $0 < x < \epsilon$ .  $S_\eta^0$  is the value of  $S_\eta$  at the twin ends,  $\epsilon$  a small distance from these ends. Then the force acting on a single dislocation at point  $x$ , due to all the other dislocations along the twin, is given by

$$\psi(x) \equiv \int_a^b \frac{\rho(\xi) d\xi}{x - \xi} = S_0 + S_\eta(x) - f(x). \quad \text{If symmetric stress is assumed}$$

which vanishes together with  $|x|$ , ( $f(x) = f(-x)$ ). The ends of the twin will be at equal distances from the source ( $x = \pm a$ ) and the dislocation density along a free twin is found to be

$$\rho(x) = -\frac{1}{\pi^2} \sqrt{a^2 - x^2} \int_{-a}^a \frac{f(\xi) - S_\eta(\xi)}{(\xi - x) \sqrt{a^2 - \xi^2}} d\xi. \quad (4)$$

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the central thickness of the twin is given by  $h = d \int_0^a \rho(x) dx$ ,  $d$  being the distance between the atomic planes in the  $y$  direction.

$$F(a) = S_0 - I(a), \quad (7)$$

$$F(a) = \frac{1}{\pi} \int_{-a}^a \frac{f(x) dx}{\sqrt{a^2 - x^2}}, \quad I(a) = \frac{1}{\pi} \int_{-a}^a \frac{S_n(x) dx}{\sqrt{a^2 - x^2}}.$$

$$\left. \begin{aligned} I(0) &= S_n^0, \quad I'(0) = 0, \quad I'(a) \leq 0, \\ I(a) &= \frac{2}{\pi} \int_0^a \frac{P(a-x) dx}{\sqrt{a^2 - x^2}} \cong \frac{1}{\sqrt{a}} M, \quad M = \frac{\sqrt{2}}{\pi} \int_0^\infty \frac{P(x) dx}{\sqrt{x}}, \quad a \gg \epsilon, \end{aligned} \right\} \quad (8)$$

are the solutions of the problem. The constant  $M$  is independent of the length of the twin.  $F_{\max} > S_0$  is found to be a necessary, but not alone sufficient, condition for the occurrence of a twin. Sufficient conditions are found for two different cases: (1)  $F(a)$  decreases monotonically with increasing  $a$  and faster than  $I(a)$ . This occurs if  $S_n \ll S_0$ . For twin  
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formation it is then sufficient for the external force at the dislocation source to exceed  $S_0 + S_0^0$ . (2)  $F(a)$  is either a monotonic function of  $a$  and decreases initially more slowly than  $I(a)$  or  $F(a)$  is nonmonotonic, e.g. it has a minimum at  $a=0$ . In this case  $f(0) < S_0^*$  is only under certain

circumstances a sufficient condition. When the stress is removed from the crystal the shape of the twin is determined by the ratio of the length of the twin layer and the surface tension. If the twin is long and the surface tension low, the twin is preserved; if it is short and surface tension high, it vanishes. The special cases: (1)  $S_0^0 < S_0$ ,  $f_0(0) < 2S_0$ , (2)  $M < \sqrt{a_0} S_0$ ,  $f_0(0) > 2S_0$ , and (3)  $M > \sqrt{a_0} S_0$  are discussed in detail.

The hystereses for twin thickness and length are shown in Figs. 2 and 3. The author thanks I. M. Lifshits for discussions. There are 3 figures and 6 Soviet references.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR Khar'kov (Physico-technical Institute AS UkrSSR, Khar'kov)

SUBMITTED: May 3, 1961

Card 4/5C

ACCESSION NR: AR4014764

S/0058/63/000/012/E032/E032

SOURCE: RZh. Fizika, Abs. 12E268

AUTHOR: Kosevich, A. M; Pastur, L. A.

TITLE: Dislocation model of a thin twin at the surface of a crystal

CITED SOURCE: Sb. Fiz. shchelochno-galoidn. kristallov. Riga, 1962, 482-485

TOPIC TAGS: crystal, twin, twin dislocation, dislocation interaction, Peierls force, stacking fault, twin profile, screw dislocation

TRANSLATION: The equilibrium distribution of twinning dislocations along a thin twin layer  $\rho(x)$  of length  $L$  is determined from the condition

$$\int_a^L \rho(y) dy / (y - x) + \int_a^L K(y, x) \rho(y) dy - f(x) = 0.$$

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ACCESSION NR: AR4014764

The first term describes the elastic interaction of the dislocations, the second the force of attraction to the surface of the body, and the third the inelastic forces (the Peierls force and the surface tension force of the stacking fault behind the dislocation);  $a$  is of the order of the height of the jog at the emergence of the twin to the surface. The profile of the twin was investigated in the following cases: (a) inner end of the twin free, (b) stopped, (c) plane-parallel (through) twin, (d) outer end of the twin wedged in at the point  $x = a$  near the surface. For the case of screw dislocations in the twinning plane normal to the external surface of the crystal, an explicit form of  $\rho(x)$  was obtained. The errors in the earlier papers of the authors are corrected (RZhFiz, 1961, 9E74, 11E54). A. Orlov.

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ENCL: oo

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S/181/62/004/005/005/055  
B102/B104AUTHOR: Kosevich, A. M.

TITLE: Some problems of the dislocation theory of twin crystals

PERIODICAL: Fizika tverdogo tela, v. 4, no. 5, 1962, 1103 - 1112

TEXT: The formation and growth of free twin crystals in an unbounded isotropic medium is investigated. First, the behavior of twinning dislocations under the action of external load is studied on the assumption of plane deformation. The dimension of the free twin as dependent on the properties of the material and the external forces is given by the relation

$$F(L) = S_0 + I(L), \quad (11)$$

$$F(L) = \frac{1}{\pi} \int_{-L}^L \frac{f(x) dx}{\sqrt{L^2 - x^2}}, \quad I(L) = \frac{1}{\pi} \int_{-L}^L \frac{S_n(x) dx}{\sqrt{L^2 - x^2}}. \quad (12),$$

where  $2L$  is the length of the twin,  $S(x) = -S_0 - S_n(x)$  is a force of inelastic origin;  $S_0 \sim \sigma_B/b\mu$ ;  $\sigma_B$  is the yield point of the material,  $\mu$  is Card 1/3



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the shear modulus of the medium, and  $b$  is the magnitude of the Burgers vector;  $S_n(x)$  is the surface tension acting on the "opening" of the twin. An analogous relation holds also for the radius of the twin. In addition, the role of the forces of inelastic origin in the two-dimensional case, and the shape of the "opening" of the twin are investigated. It is found that, if  $S(x) = 0$ , no free equilibrium twin of finite size can be formed under the action of an external load of constant sign. Its formation is occasioned only by the forces of inelastic origin acting on the twinning dislocations. Next, the relation between the thickness of the twin and its radius is determined for the axisymmetric case:

$$\frac{h(0)}{R} \equiv \frac{\Phi_0 M^{1/2} d}{4(2\Phi_1)^{1/2}} \sim \frac{d}{r_0} (M \sqrt{r_0})^{1/2} (f(0) r_0)^{1/2}. \quad (35).$$

$h(0)$  is the thickness of the twin in its central part, and

$$\frac{\Phi_0}{L} = S_0 + \frac{M'}{\sqrt{L}}; \quad M = \frac{\sqrt{2}}{\pi} \int_0^L \frac{S_n(x) dx}{\sqrt{L-x}}. \quad (17).$$

Here also it is found that the ratio between the dimensions tends to zero  
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as the forces of inelastic origin do so. Finally, it is shown that no twin of finite size can be formed if only an external uniform load is present. I. M. Lifshits is thanked for discussions. There are 2 figures.

ASSOCIATION: Fiziko-tehnicheskiy institut AN USSR Khar'kov (Physico-technical Institute AS UkrSSR, Khar'kov)

SUBMITTED: November 30, 1961

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38926

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B178/B104

24.7500

AUTHORS: Kosevich, A. M., and Pastur, L. A.

TITLE: A thin twin of the flat surface of an anisotropic body

PERIODICAL: Fizika tverdogo tela, v. 4, no. 6, 1962, 1679 - 1680

TEXT: The dislocation model of a two-dimensional twin is studied. In order to calculate the equilibrium conditions, the stress tensor of each dislocation must be known

$$\sigma_{11} = -\frac{\partial \varphi_i}{\partial y}, \quad \sigma_{12} = \frac{\partial \varphi_i}{\partial x},$$

$$\varphi_i = 2\operatorname{Re} \sum_{\alpha=1}^3 f_{i\alpha} \Phi_{\alpha}(z_{\alpha}), \quad z_{\alpha} = x + \mu_{\alpha} y, \quad (1)$$

wherein  $f_{i\alpha}$  and  $\mu_{\alpha}$  are complex numbers clearly determined by the elastic modulus of the substance, and  $\Phi_{\alpha}(z)$  is a function of complex variables. For  $\Phi_{\alpha}(z)$  the following are valid:

$$\Phi_{\alpha}(z) = \frac{1}{4\pi} M_{\alpha j} d_j \ln(z - z_{\alpha}^0) + \Phi_{\alpha}^{(1)}(z). \quad (2)$$

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and 
$$\Phi_{\alpha}^{(1)}(z) = \frac{1}{i\pi\Delta} \sum_{\beta=1}^3 \Delta_{\beta\alpha} \sqrt{f_{\beta}} M_{\beta j} d_j \ln(z - z_{\beta}^0), \quad (3)$$

where  $z_{\alpha}^0 = x_{\alpha} + i\mu_{\alpha} y_{\alpha}$ ;  $M_{\alpha j}$  = inverse matrix of  $f_{\alpha}$ ;  $d_j$  is defined by the elastic modulus of the substance and the Burgers vector  $b$  of the dislocation.  $\Delta = \det \|f_{\alpha}\|$ ;  $\Delta_{\beta\alpha}$  = algebraic complement of the matrix elements  $f_{\alpha}$ ;  $(x_{\alpha}, y_{\alpha})$  are the coordinates of the point of application of the dislocation lines. The stress field of the rectilinear dislocations is obtained from equations (1) - (3).

$$\int_a^L \frac{\rho(\xi) d\xi}{\xi - \eta} + \int_a^L K(\eta, \xi) \rho(\xi) d\xi = \frac{1}{N} (b_1 \sigma_{\xi\eta}^* + b_2 \sigma_{\xi\xi}^* + S), \quad (4)$$

$$K(\eta, \xi) = \frac{1}{2\pi\Delta N} \operatorname{Re} \sum_{\alpha=1}^3 \left\{ b_1 \left[ f_{1\alpha} \cos 2\theta - (f_{1\alpha} \mu_{\alpha} + f_{2\alpha}) \frac{\sin 2\theta}{2} \right] - b_2 f_{3\alpha} \mu_{\alpha} \right\} Y_{\alpha}(\eta, \xi),$$

$$Y_{\alpha}(\eta, \xi) = \sum_{\beta=1}^3 \Delta_{\beta\alpha} \sqrt{f_{\beta}} M_{\beta j} d_j [\eta \mu_{\alpha}' - \xi \mu_{\beta}' ]^{-1},$$

$$N = \frac{1}{2\pi} \operatorname{Re} \sum_{\alpha=1}^3 \left\{ b_1 \left[ f_{1\alpha} \cos 2\theta - (f_{1\alpha} \mu_{\alpha} + f_{2\alpha}) \frac{\sin 2\theta}{2} \right] - b_2 f_{3\alpha} \mu_{\alpha}' \right\} \frac{M_{\alpha j} d_j}{\mu_{\alpha}'}$$

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S/181/62/004/009/031/045  
B102/B186

AUTHORS: Pastur, L. A., Fel'dman, E. P., Kosevich, A. M., and Kosevich, V. M.

TITLE: Rectilinear dislocation in the plane of discontinuity of elastic constants in an unbounded anisotropic medium

PERIODICAL: Fizika tverdogo tela, v. 4, no. 9, 1962, 2585 - 2592

TEXT: Calculations of the stress and displacement field of a dislocation line are based on a model which assumes an isotropic medium, as investigated by A. K. Head (Proc. Phys. Soc., B66, 793, 1953): The dislocation line is assumed as running parallel ( $\parallel z$ ) to the plane of discontinuity ( $xOz$ ) of the elastic constants and situated near this plane, with the Burgers vector oriented in an arbitrary direction. The dislocations are in the upper semispace ( $y > 0$ ), and the dislocation line is assumed to cut the  $xOy$  plane at the point  $(0, y_0)$  where the stress tensor  $\sigma_{ik}^0$  is acting. In this model, the stress tensor and displacement vector are given by

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$$\sigma_{ik} = \begin{cases} \sigma_{ik}^0 + \sigma_{ik}^+, & y > 0 \\ \sigma_{ik}^0, & y < 0 \end{cases} \quad (i, k=1, 2, 3), \quad (1)$$

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and

$$u_i = \begin{cases} u_i^0 + u_i^+; & y > 0 \\ u_i^- & , y < 0 \end{cases} \quad (i=1, 2, 3). \quad (2)$$

$\sigma_{ik}^0$  and  $u_{ik}^0$  are assumed to be known; they are defined by

$$\left. \begin{aligned} \sigma_{i2}^0 &= \frac{1}{4\pi} 2\text{Re} \sum_{\alpha=1}^3 f_{i\alpha} M_{\alpha} d_{\alpha} (z_{\alpha} - z_{0\alpha})^{-1}, \\ u_i^0 &= \frac{1}{4\pi} 2\text{Re} \sum_{\alpha=1}^3 p_{i\alpha} M_{\alpha} d_{\alpha} \ln(z_{\alpha} - z_{0\alpha}), \end{aligned} \right\} \quad (10)$$

(A. N. Stroh, Phil. Mag., 3, 625, 1958). In this case, the complex representation

$$\left. \begin{aligned} \sigma_{i1} &= -\frac{\partial \varphi_i}{\partial y}, \quad \sigma_{i2} = \frac{\partial \varphi_i}{\partial x}; \\ \varphi_i &= 2\text{Re} \sum_{\alpha=1}^3 f_{i\alpha} \Phi_{\alpha}(z_{\alpha}); \\ u_i &= 2\text{Re} \sum_{\alpha=1}^3 p_{i\alpha} \Phi_{\alpha}(z_{\alpha}), \end{aligned} \right\} \quad (6)$$

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is used, where  $z_\alpha = x + \mu_\alpha y$ ;  $\mu_\alpha$ ,  $f_{i\alpha}$ , and  $p_{i\alpha}$  are complex numbers, unambiguously connected with the elastic constants;  $\Phi_\alpha(z_\alpha)$  are certain functions of a complex variable;  $(M_{\alpha j})$  is a matrix inverse to  $(f_{j\alpha})$ , the  $d_j$  are real numbers uniquely determinable by the elastic constants and the Burgers vector and by  $z_{0\alpha} = \mu_\alpha^+ y_0$ .

$$\begin{cases} \sigma_{i2}^-(x, 0) - \sigma_{i1}^+(x, 0) = \sigma_{i2}^0(x, 0), \\ u_i^-(x, 0) - u_i^+(x, 0) = u_i^0(x, 0). \end{cases} \quad (5)$$

presents the problem in such a way that the plane of discontinuity becomes the interface of two anisotropic media of different elastic constants, and

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$$\left. \begin{aligned} \sigma_{11}^+ &= -\frac{1}{2\pi} \operatorname{Re} \left\{ \sum_{\alpha, \beta=1}^3 \frac{1}{\Delta} f_{i\beta}^{+1} M_{\alpha j}^+ d_j^+ \Delta_{\beta\alpha} (z_{\beta}^+ - z_{0\alpha})^{-1} \right\}, \\ \sigma_{12}^+ &= \frac{1}{2\pi} \operatorname{Re} \left\{ \sum_{\alpha, \beta=1}^3 \frac{1}{\Delta} f_{i1}^+ M_{\alpha j}^+ d_j^+ \Delta_{\beta\alpha} (z_{\beta}^+ - z_{0\alpha})^{-1} \right\}, \\ \sigma_{11}^- &= -\frac{1}{2\pi} \operatorname{Re} \left\{ \sum_{\alpha, \beta=1}^3 \frac{1}{\Delta} f_{i\beta}^{-1} M_{\alpha j}^+ d_j^+ \Delta_{\beta\alpha}^{(1)} (z_{\beta}^- - z_{0\alpha})^{-1} \right\}, \\ \sigma_{12}^- &= \frac{1}{2\pi} \operatorname{Re} \left\{ \sum_{\alpha, \beta=1}^3 \frac{1}{\Delta} f_{i\beta}^- M_{\alpha j}^+ d_j^+ \Delta_{\beta\alpha}^{(1)} (z_{\beta}^- - z_{0\alpha})^{-1} \right\}, \end{aligned} \right\} \quad (13)$$

is finally obtained from these relations. In (13),  $\bar{\Delta}$  is a conjugate complex to the determinant  $\Delta$ , and  $\Delta_{\beta\alpha}^{(1)}$  are obtained from  $\bar{\Delta}$  by substituting the  $(\beta + 3)$ th column by the  $f_{i\alpha}^+$  and  $p_{i\alpha}^+$  column, constructed in the same manner as for  $\Delta_{\beta\alpha}$ . The formulas obtained are used to

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calculate stresses in the symmetry plane of a twin crystal and the stresses of a dislocation on an otherwise stress-free surface of an anisotropic semispace. A general formula is derived for the force acting on a dislocation in a plane of discontinuity. This formula becomes transformed into Head's formula if the Poisson ratio is equal in the two semispaces. ✓

ASSOCIATION: Khar'kovskiy politekhnicheskii institut im. V. I. Lenina  
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SUBMITTED: March 2, 1962 (initially) May 25, 1962 (after revision)

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S/056/62/042/001/024/048  
B104/B102

24.4200

AUTHOR: Kosevich, A. M.

TITLE: Deformation field in an isotropic, elastic medium with moving dislocations

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 1, 1962, 152-162

TEXT: The differential equations proposed by E. F. Holländer (Czech. J. Phys. B10, 409, 1960; B10, 479, 1960; B10, 551, 1960) are based on wrong premises: the difference between the velocities of Rayleigh surface waves and shear waves in a solid is neglected, and quantities of no physical significance are assumed. In the present paper, a system of equations is derived for the deformation field of moving dislocations, the Burgers vector density of dislocations and their flux being regarded as the sources of the fields of the dislocation tensor field and of the vector of medium displacement. The system is solved by the introduction of auxiliary quantities (potential fields). The field of elastic deformation tensors and the field of displacement velocity vectors of the medium elements can

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be determined in a general form if the Burgers vector density of dislocations and their flux are known as functions of coordinates and time. Then, one obtains

$$\rho \frac{\partial v_i}{\partial t} = \mu \nabla_k (u_{ik} + u_{ki}) + \lambda \nabla_i u_{kk}$$

$$e_{ilm} \nabla_l u_{mk} = -D_{ik}, \quad \nabla_i v_k = (\partial u_{ik} / \partial t) - I_{ik} \quad (21).$$

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Based on it, the deformation field is examined at large distances from a system of moving dislocations. The intensity of elastic waves produced by such a system is computed.  $v_i$  is the velocity of the medium elements,  $u_{ik}$  are the elements of the tensor of elastic distortion,  $\lambda$  and  $\mu$  are the Lamé constants, and  $D_{ik}$  is the Burgers vector density. I. M. Lifshits and V. L. Indenbom are thanked for discussions. There are 13 references: 4 Soviet-bloc and 9 non-Soviet-bloc. The four most recent references to English-language publications read as follows: F. R. Nabarro. Adv. Phys., 1, 269, 1952; J. D. Eshelby. Solid State Phys., 3, 79, 1956; B. A. Bilby. Progr. Solid. Mech., 1, 329, 1960; J. D. Eshelby. Phys. Rev., 90, 248, 1953.

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Deformation field in an...

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ASSOCIATION: Fiziko-tekhnicheskii institut Akademii nauk Ukrainskoy SSR  
(Physicotechnical Institute of the Academy of Sciences  
Ukrainskaya SSR)

SUBMITTED: June 14, 1961

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39495  
S/056/62/043/002/038/033  
B125/B102

AUTHOR: Kosevich, A. M.

TITLE: Equation of motion of a dislocation.

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v..43(9),  
no. 22(8); 1962; 637 - 648

TEXT: The shift of the dislocation line is assumed not be connected with a shift of mass and no additional volume forces of any kind are to act. The equation of motion of the dislocation:  $\epsilon_{jlk} \tau_{lk}^b = 0$  (21), resulting from the Lagrangian

$$L = \int \mathcal{L} d\Omega, \quad \mathcal{L} = \frac{1}{2} (\sigma_{ik} \epsilon_{ik} - \rho v^2) - \alpha_{ik} \psi_{ik} + J_{ik} \psi_{ik}, \quad (12)$$

for the field of elastic stresses and dislocations, is similar in form to the equation of the dislocation in equilibrium. It relates the motion of the dislocation loop and the self-consistent field of the dislocation thereby produced to the external fields. In the approximation used here, (21) does not contain any forces determining the effect of the rate of

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Equation of motion of a dislocation

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shift of the elastic medium on the dislocation motion. In isotropic media, the stress tensor  $\sigma_{ik} = 2\sigma\epsilon_{ik} + \delta_{ik}\lambda\epsilon_{ll}$  with

$$e_{ll} = \frac{\gamma^2}{2\pi} \left\{ (nD) \frac{d\Omega}{R^2} - \frac{1}{2a^2} \frac{\partial}{\partial t} \left\{ n_i J_{ik} n_k \frac{d\Omega}{R} \right\} + \frac{1}{4\pi c^2} (1 - \gamma^4) \frac{\partial}{\partial t} \left\{ J_{ll} \frac{d\Omega}{R} \right\} \right. \quad (29)$$

follow from Hooke's law in linear approximation with respect to the velocity of the dislocations. When determining the effective mass of the dislocation, the self-acting forces of the dislocation and the singularity of its self-consistent field should be eliminated from (21). The field

$\vec{\sigma} = \hat{\sigma}^e + \hat{\sigma}^s$  in (21) consists of the external field  $\hat{\sigma}^e$  and of the self-consistent field  $\hat{\sigma}^s$  of dislocation stresses, made up of the quasi-static field and of the stress proportional to the acceleration of the dislocations. Only that component of the dislocation velocity normal to the dislocation line contributes to the stress. Considering the motion of the dislocation loop as a whole,

$$\mathfrak{R}_{ik} = \frac{\rho b^2 r_m}{4\pi} \left\{ (\delta_{ik} - \tau_i \tau_k) (1 + \gamma^4 \sin^2 \theta) + [\beta \tau]_i [\beta \tau]_k \phi_0 \right\} \cdot \ln \frac{r_m}{r_0}, \quad (44)$$

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is obtained for the total mass of the straight-line dislocation. The possible motion of the elements of the dislocation loop can be investigated separately from the dislocation loop as a whole.

ASSOCIATION: Fiziko-tekhnicheskii institut Akademii nauk Ukrainskoy SSR  
(Physicotechnical Institute of the Academy of Sciences of  
the Ukrainskaya SSR)

SUBMITTED: March 8, 1962

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S/056/62/043/003/049/063  
B108/B102

AUTHORS: Andreyev, V. V., Kosevich, A. M.

TITLE: On the quantum theory of the normal skin effect in a magnetic field at low temperatures

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 3(9), 1962, 1060 - 1067

TEXT: An electron gas in a strong uniform magnetic field under conditions of normal skin effect (weak variable electric field) is considered. The electron mean free time  $\tau_0$  is assumed to be greater than the time of revolution on an orbit in the magnetic field:  $\Omega\tau_0 \gg 1$ . Since quasi-classical approximation is used, this assumption is implicit in the condition  $\hbar\Omega \ll \xi_0$  where  $\xi_0$  is the Fermi boundary-energy. The quantum kinetic equation, neglecting electron-electron interaction, has the form

$$\partial p / \partial t = (i/\hbar) \{ [p, \mathcal{H}] + N \text{Sp}_a [G_a, U_a] \}. \quad (4)$$

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where  $N$  is the number of impurities per unit volume,  $U$  is the interaction potential of an electron with a point impurity,  $G$  is a binary correlative operator. The subscript  $\alpha$  refers to the  $\alpha$ -th impurity. Eq. (4) is linearized by using the substitutions  $\rho = f(\epsilon) + \rho_1$  and  $G = G_0 + G_1$ . The quantum kinetic equation for the correction  $\rho_1$  to the equilibrium density matrix is then

$$i\omega\rho_1 - (i/\hbar) [\rho_1, \epsilon] + D_0(\rho_1) = (i/\hbar) [f, \mathcal{H}_1] - eED_1(f), \quad (11),$$

$$D_0(\rho) = - (i/\hbar) N \text{Sp}_\alpha [G_{0\alpha}, U_\alpha], \quad eED_1(f) = - (i/\hbar) N \text{Sp}_\alpha [G_{1\alpha}, U_\alpha]. \quad (12).$$

Eq. (11) is solved for square-law isotropic dispersion of the electrons and scattering from point impurities. Conductivity in this case can be found from  $j_i = e \text{Sp}_i v_i \rho_1 = \sigma_{ik} E_k$ . For the case of an arbitrary dispersion law and a small potential of the impurities, Eq. (11) is solved by means of perturbation theory. The electrical conductivity tensor is split into a classical part and a part subject to quantum oscillation, depending on the electron effective mass. Consequently, additional information on

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On the quantum theory of the...

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the electron effective mass can be gathered by studying the frequency dependence of the conductivity oscillations.

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