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APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001860310001-1"

Begin
#657

NOZHKIN, M.I.; VLASOV, I.N.; PAVLOVA, N.I.

In the Scientific and Technical Council of the All-Union Farm Machinery Association. Mekh. i elek. sots. sel'khoz. 2(no.1: 62-63 '62. (. RA 15:2)

(Agricultural machinery)

VLASOV, I.N.

Improve the testing of new farm machinery. Sel'khozmashina no.10:
3-4 O'55.
(MLRA 8:12)

1. Direktor Povolzhskoy mashinoispytatel'noy stantsii
(Agricultural machinery--Testing)

VLASOV, I.N., inzh.

ZHBA-3,5 mounted harvester. Zemledelie 24 no.6:64-65 Je '62.
(MIRA 15:11)

(Harvesting machinery)

85018

9.4300 (1137,1138,1143) S/126/60/010/004/020/023
E032/E314

AUTHORS: Berdyshev, A.A. and Vlasov, I.N.

TITLE: Resistivity of an Antiferromagnetic

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol. 10, No. 4, pp. 628 - 629

TEXT: Kasuya and Mannavi (Ref. 1) have calculated the electrical resistivity of an antiferromagnetic transition metal at low temperatures, assuming that the interaction energy between conduction electrons and spin waves is constant. It is shown in the present paper that the results obtained by these authors can also be obtained (and in fact were obtained earlier - Ref 2) by the s-d exchange model of Vonsovskiy et al. In a later paper Berdyshev et al (Ref. 3) obtained the exact form of the energy operator for an antiferromagnetic (Eq. 2). Using this operator it can be shown that the "magnetic" part of the resistivity is given by:

Card 1/2

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S/126/60/010/004/020/023
E032/E314

Resistivity of an Antiferromagnetic

$$\rho_{\mu} = \frac{13.5\pi m^2 I^2}{h^2 e^2 N z^{5/2} J^5 k F^2} (kT)^5 \qquad (4)$$

(in the absence of anisotropy). This expression is different from that obtained by Kasuya and Mannavi (Ref. 1). The reason for this difference is that Kasuya and Mannavi used an approximate form for the interaction potential while the present authors used an exact form. There are 7 references: 2 English, 1 Russian translation from German and 4 Soviet.

ASSOCIATION: Ural'skiy gosudarstvennyy universitet im. A.M. Gor'kogo (Ural State University im. A.M. Gor'kiy)

SUBMITTED: January 15, 1960

Card 2/2

BERDYSHEV, A.A.; VLASOV, I.I.

Electric resistance of antiferromagnetic materials. Fiz. met. i metalloved. 10 no.4:628-629 O '60. (MIRA 13:11)

1. Ural'skiy gosudarstvennyy universitet imeni A.M. Gor'kogo.
(Ferromagnetism)

VLASOV, I.N., inzh.

In the joint Scientific and Technological Council.
Zemledelie 24 no.10:85-86 O '62. (MIRA 15:11)
(Corn (Maize))
(Agricultural machinery)

VLASOV, I. N., inzh.

Continuous line methods for harvesting grain crops. Mekh. i elek. sots. sel'khoz. 20 no.6:60-61 '62. (MIRA 16:1)

(Grain—Harvesting)

VLASOV, I.N., inzh.

Columnar grain cleaner for pulse crops. Zemledelie 25 no.6: 61-62 Je '63. (MIRA 16:7)

(Legumes) (Grain—Cleaning)

VLASOV, L.O.

AMR

31

4017. Vlasov, L. O., Distribution of velocity of filtration in inclined layers under pressure (in Russian), *Prikl. Mat. Mekh.* 15, 1, 117-119, Jan.-Feb. 1951.

Author considers the flow of a viscous fluid towards the drill hole up an inclined porous layer of constant thickness bounded above and below by two impervious strata. The flow takes place in a vertical plane, under pressure supplied by the second non-viscous fluid displacing the first from below.

By conformal transformation, expressions are obtained for the components of the velocity anywhere between the dividing boundary of the two liquids and the drill hole in terms of the total discharge of the drill hole.

Alexander Hrennikoff, Canada

Oct. '51

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

VLASOV, I.O.

Vlasov, I. O., and Carnyl, L. A. On a method of numerical integration of ordinary differential equations.

The authors present and illustrate with several numerical examples a simple method of solving ordinary differential equations numerically. For a single equation of first order $dy/dx=f(x, y)$ the step from x_0 to x_1 is computed by the formula

$$y_1=y_0+\frac{[f(x_0, y_0)+f(x_1, y_0)](x_1-x_0)}{2-f_y(x_1, y_0)(x_1-x_0)}.$$

For systems of equations the step is made with obvious generalizations of this formula. *W. E. Milne.*

Source: Mathematical Reviews, Vol 13 No. 3

CA VLASOV, I.P.

Polymerization of oils in electrodeless high frequency discharge. G. M. Panchenkov and I. P. Vlasov. *Trudy Moskov. Neftyan. Inst. im. I. M. Gubkina* 1946, No. 4, 121-7; cf. C.A. 33, 8573[9]. — Changes in the properties of an aviation oil (I) and the oil fraction of a cracking residue (b. 170-350°) (II) caused by an electrodeless, high-frequency discharge were studied by the method used previously (C.A. 33, 8573[9]). Results of expts. of 10, 20, and 30 hrs. were compared. Density, η, mol. wt., and surface tension for the oil-water interface of both oils increased and f.p. decreased with duration of the discharge. Increase in η per unit time was greater for I than for II. Surface tension for the air-oil interface remained const. Aromatic content of I remained practically const., but increased in II. Percentage of unsatd. hydrocarbons increased in I but remained unchanged in II. N. C.

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BOOK EXPLOITATION

Bel'skiy, Vladimir Leonidovich; Vlasov, Ivan Petrovich; Zaytsev, Valentin Nikolayevich; Kan, Saveliy Nakhimovich (Doctor of Technical Sciences, Professor); Karnozhitskiy, Vladimir Pavlovich; Kots, Veniamin Markovich; Lipovskiy, David Yevseyevich

Aircraft design (Konstruktsiya letatel'nykh apparatov) Moscow, Oborongiz, 1963. 708 p. illus., biblio. Errata slip inserted. 6200 copies printed.

TOPIC TAGS: aircraft construction, aircraft strength, aircraft design, aircraft rigidity, aircraft hydraulics, aircraft pneumatics, aircraft servo, aircraft service life, aeroelasticity, aerodynamic heating

PURPOSE AND COVERAGE: The book is intended for aeronautical engineers concerned with aircaft design and manufacture. It may also be useful to students of technical schools of higher education. The principles of aircraft construction and strength are discussed. The principles of arrangement are examined, and design methods for strength and rigidity are given. External design loads are analyzed, and other

Card 1/5

AM4007943

problems in the construction of airplanes, rockets, and helicopters are examined. The pneumatic and hydraulic aircraft systems as well as hydraulic servos are described. Considerable attention is paid to the problems of aeroelasticity, service life, and aerodynamic heating. The factual and numerical data and the schematic diagrams of aircraft are taken from non-Soviet sources. The authors thank K. A. Ly*nshinsky for writing article 3 of Ch. 2 and N. M. Mitrofanov who particpated in selection of material for some chapters. Special appreciation is expressed to A. M. Okulov for illustrating the book and to Doctors of Technical Sciences A. R. Bonin and Professor L. P. Ninokurov, and Candidates of Technical Sciences N. G. Savusya, L. A. Kolesnikov, A. A. Yarkho and V. P. Rusanov for their valuable suggestions during the review and revision of the manuscript.

TABLE OF CONTENTS [Abridged]:

VLASOV, I.P.

Cancer of the gallbladder based on clinical data for 13 years. Trudy LSGMI 74:184-188 '62. (MIRA 17:10)

APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001860310001-1"

VLASOV, I.S., master.

Indicator of the flow of a short circuit current. Energetik 3 no.1:22-24 Ja '55. (MLRA 7:12)
(Short circuits)

VLASOV, I.S.

AID P - 1633

Subject : USSR/Electricity

Card 1/1 Pub. 29 - 15/23

Author : Vlasov, I. S., Foreman

Title : Indicator of a short circuit currents

Periodical : Energetik, 1, 22-24, Ja 1955

Abstract : To locate a short-circuit in an aerial electric power line an electromagnetic apparatus was designed and constructed by the author. The design and operation of the apparatus is described. Pictures and 2 diagrams are shown.

Institution: None

Submitted : No date

PA 24T24

VLASOV, I. YA

USSR/Engineering
Steam Engineering
Thermal Analysis

Aug 1947

"A New Method of Thermal Computation for Steam-generating Units Operating on Schedules Distinct from Those Specified by the Original Design," I. Ya. Vlasov, T. Kh. Margulova, Lecturers, MEI imeni Molotov, 5 pp

"Kotloturbostroyeniye" No 4

The proposed methods permit immediate thermal computations for all changes in the schedule of the steam-generating unit with great accuracy and little loss of time. The method can be used for ordinary testing of thermal computation of the steam-genera-

24T24

USSR/Engineering (Contd)

Aug 1947

ting unit for any load. Discussion is replete with mathematical formulas and graphic data.

24T24

387. CALCULATIONS OF OPERATIONAL AS DISTINCT FROM DESIGNED THERMAL EFFICIENCY OF STEAM GENERATORS. Vlasov, I. Y. and Margulova, T. K. (Kotloturbostroyeniye, Aug. 1947, (4), 21-25). This method obviates the usual successive approximations and while equally accurate, is quicker than the old methods, and in close agreement with practical results. Graphs and formulae are given.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

VLASOV, I. Ya.

A New Method for Determining the Heat Capacity of Boiler Installations for Conditions Differing from These Calculated by Extrapolation. (In Russian.) I. Ya. Vlasov and T. Kh. Margulova. *Kotloturbostroenie* (Boiler and Turbine Manufacture), Aug. 1947, p. 21-25.

Assumes that the thermal efficiency of a boiler continuously changes during operation. The method proposed does not require subsequent approximate calculation of individual factors, which is said to speed up the work without loss of accuracy.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

VLASOV, K.

"New work contest." Tr. from the Russian. p. 23. (TOBBTERMELES, Vol. 6, no. 6, June 1952. Budapest.)

SO: Monthly List of East European Accessions, Vol. 2, #8, Library of Congress August, 1953, Uncl.

VLASOV, K.

1. K. VLASOV

2. USSR (600)

4. Automobile Industry

7. A year of work by mixed teams. Za ekon. mat. no. 1. 1953.

9. Monthly List of Russian Accessions, Library of Congress, April 1953, Uncl.

VLASOV, K.A., glav. red. [deceased]; SEMENOV, Ye.I., doktor geol.-min. nauk, otv. red.; TIKHONENKOVA, R.P., kand. geol.-min. nauk, otv. red.

[Mineralogy and genetic characteristics of alkali massifs] Mineralogiia i geneticheskie osobennosti shchelochnykh massivov. Moskva, Nauka, 1964. 193 p. (MIRA 18:2)

1. Akademiya nauk SSSR. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov. 2. Chlen-korrespondent AN SSSR (for Vlasov).

VLASOV, K.A.

Per.odic law, isomorphism and paragenesis of elements. Dokl. AN SSSR 155 no. 5:1091-1094 Ap '64. (MIRA 17:5)

1. Chlen-korrespondent AN SSSR.

VLASOV, K.A.; BELOV, N.V.; VOL'FSON, F.I.; GENKIN, A.D.; GINZBURG, A.I.; LUKIN, L.I.; KORZHINSKIY, D.S.; SALTYKOVA, V.S.; SAUKOV, A.A.; SOKOLOV, G.A.; SHCHERBAKOV, D.I.; SHADLUN, T.N.

Konstantin Avtonomovich Nenadkevich, 1830-1963; obituary. Geol. rud. mestorozh. 6 no.1:123-125 Ja-F '64. (MIRA 17:11)

VLASOV, K.A., glav. red.[deceased]; FEKLICHEV, V.G., otv. red.

[Microinclusions in minerals] Mineral'nye mikrovkliuche-niia. Moskva, Nauka, 1965. 262 p. (MIRA 18:7)

1. Akademiya nauk SSSR. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov. 2. Chlen-korrespondent AN SSSR (for Vlasov).

VLASOV, K.A., glav. red. [deceased]; BEZSMERTNAYA, M.S., otv. red.; FEKLICHEV, V.G., otv. red.

[Experimental methodological studies of ore minerals] Eksperimental'no-metodicheskie issledovaniia rudnykh mineralov. Moskva, Nauka, 1965. 303 p. (MIRA 18:6)

1. Moscow. Institut mineralogii, geokhimii i kristallokhimii redkikh elementov. 2. Chlen-korrespondent AN SSSR (for Vlasov).

PUSTOVALOV, L.V., otv. red.; AL'TGAUZEN, M.N., doktor geol.-min. nauk, red.; VLASOV, K.A., red.[deceased]; DOLGOPOLOV, N.N., red.; IVENSEN, Yu.P., doktor geol.-min.nauk, red.; POZHARITSKIY, K.L., doktor geol.-min. nauk, red.; SERDYUCHENKO, D.P., doktor geol.-min. nauk, red.;KRASNOVA, N.E., red.

[Metals in sedimentary formations; heavy nonferrous, minor and rare metals] Metally v osadochnykh tolshchakh; tiazhelye tsvetnye metally malye i redkie metally. Moskva, Nauka, 1965. 389 p. (MIRA 19:1)

1. Moscow. Laboratoriya osadochnykh poleznykh iskopayemykh.

VLASOV, K. B.

USSR/Physics - Steel, Transformer
Heat Treatment

21 Jun 49

"Coercive Force Versus Temperature in Transformer Steel Monocrystals," Ya. S. Shur, K. B. Vlasov, Inst Phys of Metals, Ural Affiliate, Acad Sci USSR, 4 pp

"Dok Ak Nauk SSSR" Vol LXVI, No 6

Studied temperature dependency for nine monocrystal discs subjected to various heat treatments (high-temperature annealing in H_2, magnetic cooling with a shield, aging) by recording polar isotherms of $H_c(a)$ from -195 to 200° (a the angle in the disc's plane between field direction and an arbitrary diameter) and $H_c(t)$ along directions corresponding to maximum and minimum of H_c on polar isotherms from -195 to 400°. Found a normal temperature dependency of H_c (H_c decreases with temperature rise) in discs of little anisotropy of H_c in the disc plane and for those monocrystals in which, due to magnetic cooling, the polar isotherms had only one minimum and one maximum. An anomalous H_c vs T relation was found in discs of low H_c, and great anisotropy of H_c, two maxima, and two minima on the polar isotherms. Submitted by Acad S. I. Vavilov 23 Apr 49.

PA 151T100

USSR/Physics - Steel, Dynamo
Aging, Steel

Dec 49

"Influence of Aging Upon the Form of the Curve Describing the Temperature Dependence of Coercive Force in Dynamo Steel," Ya. S. Shur, K. B. Vlasov, Inst of Phys of Metals, Ural Affiliate, Acad Sci USSR, 3 pp

"Dok Ak Nauk SSSR" Vol LXIX, No 4

Measurements made on specimens of dynamo steel in the form of small flat bars 0.5 x 2 x 60 cu mm using astatic magnetometer showed that coercive force for specimen which has undergone aging increases with

155T90

[redacted]

USSR/Physics - Steel, Dynamo (Contd)

Dec 49

temperature, at least up to temperatures of the order of 200-300°. Submitted by Acad S. I. Vavilov 28 Sep 49.

155T90

[redacted]

VLASOV, K. B.

VLASOV, K. B.

SA A 53

538.114

6321. Theory of the coercive force. K. B. VLASOV. *J. Tech. Phys., USSR* 20, 1098-101 (*Sept.*, 1950) *In Russian.*

After a discussion of Kondorskii's "stress" and "inclusion" theories and Kersten's "inclusion" theory, an alternative theory is presented for alloys representing single-phase solid solutions of ferromagnetic or non-ferromagnetic components, where the constants characterizing the ferromagnetic state (anisotropy constant K, saturation magnetostriction λ_s and Curie point θ) depend on the concentration α of the components of the alloy. As the density of the free surface energy of the boundary layers between the domains (boundary energy) γ is a function of K, λ_s and the density of the exchange energy NA, it will also be a function of the concentration α and it may therefore be expected that the critical field H_0 (on which the value of the coercive force depends) and the permeability will be determined by the volume concentration distribution, or non-uniformity of the ferromagnetic in alloys free of inclusions or with macroscopic inclusions. Introducing into Kondorskii's theory of the critical field the heuristic notion of a "wavelength" l which characterizes the dispersion of the inhomogeneities of the concentration, and assuming that the dependence of α on x has the character of a broken line, Kondorskii's formula for the critical field H_0 takes the form

$$H_0 = 4\Delta\alpha/l I_s(h_1 - h_2)\left(b\partial K/\partial\alpha + 3/2\sigma\partial\lambda_s/\partial\alpha + \frac{bK + 3/2\lambda_s\sigma}{\theta}\frac{\partial\theta}{\partial\alpha}\right)\rho$$

(I_s is saturation magnetization, h_1, h_2 cosines of angles between directions of magnetic field and vectors of spontaneous magnetization in two neighbouring domains). This formula is then tested on experimental material obtained on alloys and pure ferromagnetics and compared with other existing theories, and estimates of the amplitude of the concentration oscillation are given.

B. F. KRAUS

USSR/Metals - Coercive Force, Steel's Jan 51

"Temperature Dependence of the Coercive Force in Monocrystals of Transformer Steel," K. B. Vlasov, Ya. S. Shur, Lab Ferromagnetics, Inst Phys of Metals, Ural Affil, Acad Sci USSR

"Zhur Tekh Fiz" Vol XXI, No 1, pp 39-50

Results of measurements of temp behavior of coercive force in monocrystallic disks of transformer steel: Shows temp behavior of coercive force depends on crystallographic direction along which

[redacted] 174T41

USSR/Metals - Coercive Force, Steel's (Contd) Jan 51

measurements are conducted. Analyzes exptl laws obtained on basis of theory of magnetization curves used in eng. Submitted [illegible] Oct 49.

[redacted] 174T41

VLASOV, K. B.

VLASOV, K. B.

USSR/Physics - Conductivity, Electrical Nov 51

"Theory of Electrical Conductivity of Metals Taking Into Account Electronic Interaction," S. V. Vonsovskiy, K. B. Vlasov, A. V. Sokolov, Inst of Phys of Metals, Acad Sci Ural SSR

"Zhur Eksper i Teoret Fiz" Vol XXI, No 11, pp 1185-1200

Presents quantum mech computation of temp dependence of elec cond of metals near 0°K within the framework of a poly-electron polar model. Performed computation in approximation of weak "polarization" which allows one to use the method of quasi-particles and to apply kinetic eqs. This approximation is valid for "bad" metals with weak electron cond, whose energy spectrum is of the Bose type. Analyzes theoretical results.

204T88

VLASOV, K. B.

Alloys, Electric Conductivity.

Theory of electrical conductivity of compounded, regulated metal alloys. K.B. Vlasov. Zhur. eksp. i teor, fiz. 22 No. 2, 1952. Institut Fiziki Metallov, Ural'skogo Filiala Akademii Nauk SSSR rcd. 4 July 1951.

Monthly List of Russiam Accessions, Library of Congress, September 1952. UNCLASSIFIED

VLASOV, K.B.

USSR.

"Anisotropy of initial susceptibility and coercive force in single crystals of iron-silicon alloys." K. B. Vlasov and V. A. Korshunov. *Zhur. Tekh. Fiz.* 23, 441-4(1953).—Comprehensive math. treatment of published works.

A. P. Kotloby

VLASOV, K.B.

538.114

7179. **Atomic magnetic moments of ferromagnetics.** S. V. VONSOVSKII AND K. B. VLASOV. *Zh. éksper. teor. Fiz.*, **25**, *No.* 3(9) 327-40 (1953) In Russian.

Atomic magnetic moments are calculated using a model based on a theory of interacting external 4s- and internal 3d-electrons in the crystal lattice. One consequence of this theory is that such moments have non-integral values. Discussing pure metals the authors assume the total free energy of the electrons to be the sum of the free energies of the internal and external electrons and expressions are derived for the atomic magnetic moment at temperature T and at very low temperatures. Using a general wave-function derived by Vonsovskii [*Zh. éksper. teor. Fiz.*, **16**, 981 (1946)] and the Smirnov quantum theory of alloys, the authors go on to determine for disordered alloys the equilibrium values of magnetization due to *s*- and *d*-electrons and hence to derive an expression for χ (alloy). This is an approximately parabolic relation with respect to concentration. The authors also indicate how to work out the dependence of the Curie point on concentration. Calculation of the energy spectrum of an external electron taking account of *s–d* exchange interaction for an ordered alloy shows this has the form of two non-overlapping bands. Unlike Smirnov the authors find that in a ferromagnetic alloy the breadth of these energy bands and their separation depend on the magnitude of *d*-electron magnetization and the orientation of the spin of an *s*-electron relative to this magnetization. Analysis

(1)

Vonsovskii

gives the same expression for atomic magnetic moment as for disordered alloys. Qualitative agreement is stated to be found between experimental results for Fe-Ni alloys and the calculated dependence upon concentration and degree of ordered arrangement of the alloy—roughly parabolic in form with maximum at stoichiometrical composition. [The value of the paper would be much enhanced by an additional section giving a detailed comparison of theoretical and experimental results.] C. R. S. MANDERS

USSR/Physics - Anti-ferromagnetism

Card Pub. 43 - 5/15

Authors : Vlasov, K. B.

Title : On the theory of anti-ferromagnetism

Periodical : Izv. AN SSSR. Ser. fiz. 18/3, 339-349, May-Jun 1954

Abstract : Efforts were made to formulate an anti-ferromagnetism theory by the method of energetic gravitation centers. Expressions were derived for the susceptibility of anti-ferromagnetic monocrystals which take into consideration the anisotropy of this value for a range of comparatively high temperatures (anti-ferromagnetic Curie point). A term was established for the temperature dependence of the critical field above which the anisotropy is bound to disappear. An expression was also formulated for the anisotropy of the anti-ferromagnetic Curie point. It is shown that the susceptibility anisotropy, critical field and the Curie point anisotropy are determined by one single factor, namely, the dependence of the anti-ferro-magnetic energy upon the orientation of the elementary magnetic moments. Sixteen references : 3 USSR; 3 French; 5 USA and 5 German (1932-1954). Graphs.

Institution : Academy of Sciences USSR, Ural Branch, Institute of Physics of Metals

Submitted : May 3, 1954

VLASOV, K. B.

USSR .

1041. **Ferromagnetism of substances of ferrite type and antiferromagnetism.** K. B. VLASOV AND B. KH. ISHMUKHAMETOV. *Zh. eksper. teor. Fiz.*, 27, No. 1(7) 75-86 (1954) In Russian.

Above the antiferromagnetic Curie point the permeability follows the Curie-Weiss law, the paramagnetic Curie point differing from the antiferromagnetic one. Theoretically this indicates exchange interaction not only between sublattices but also inside the sublattices themselves. Below the antiferromagnetic Curie point the permeability is anisotropic, the perpendicular permeability being independent of temperature, and the parallel permeability dependent; the latter tends towards zero at 0°K and towards the value of the perpendicular permeability at the antiferromagnetic Curie point. The form of the temperature curve of the parallel (or resultant) permeability is determined by the ratio of the values of paramagnetic and antiferromagnetic Curie points; the smaller this ratio, the greater the slope of the curve referred to the temperature axis near the Curie point. These results agree with Neel's and van Vleck's conclusions based on the method of molecular fields. Certain differences exist for such materials as MnF_2 and FeF_2, but they are partly due to disagreements between experimental conditions which render correct comparisons difficult and the theory has so far been evolved only for a somewhat limited temperature range. B. F. KRAUS

Inst. Physics of Metals, Ural Fil., AS USSR

VLASOV, K.B.

On the effect of grain size on the magnetic properties of ferromagnetic sheet materials in the high-induction region. Fiz.met.i metalloved. 1 no.1:70-74 '55. (MLRA 9:3)

1. Institut fiziki metallov Ural'skogo filiala Akademii nauk SSSR. (Sheet steel--Magneric properties)

Vlasov, K. B.

1348 [illegible]

[illegible] No 4, 461-[illegible]
(1955) In Russian

[illegible] steady magnetic state of an anti-
[illegible]
potential, e g [illegible]imum free energy To calculate the free
energy associated with [illegible]

Inst Physics of Metals, Ural Branch AS USSR

VLASOV, K. B.

The quantum theory of ferromagnetism. S. V. Vonsovskii, K. B. Vlasov, and E. A. Turov. *Zhur. Eksptl. i Teoret. Fiz.* 29, 37-50(1955).—On the basis of a polyelectron quantum-mechanical model of a crystal there is derived the calcn. of the magnetic action of the electrons upon the ferromagnet. The energy spectrum of the system is calcd. for the case of low temps. The computation of the terms of the magnetic action in the original Hamiltonian system leads in the energy to the appearance of components of the magnetic quasiclassical type as well of terms of the type of anisotropic (magnetic) exchange. This latter fact might have some significance for the calcn. of the relaxation phenomena both in ferromagnetic and antiferromagnetic crystals. There is also derived the energy of the system close to the energy centers of gravity, i.e. the case of higher temps. An equation is obtained for the free energy as a function of the magnitude of the magnetizability and its orientation in the crystal (the energy of the magnetic anisotropy) for temps. which are close to the Curie point. Werner Jacobson

62

(2)

Inst. Physics of Metals, Ural Fil. AS USSR

VLASOV, K. B. (Sverdlovsk)

"Some Theoretical Considerations on the Theory of Elastic Ferromagnetic (Magnetostrictional) Mediums," paper presented at the International Conference on Physics of Magnetic Phenomena, Sverdlovsk, USSR, 23-31 May 1956.

VLASOV, K. B.

VLASOV, K.B.

Equations realted to the state of a polarized magnetoelastic medium.
Fiz.met. i metallovea 3 no.3:551-553 '56. (MIRA 10:3)

1. Institut fiziki metallov Ural'skogo filiala AN SSSR.
(Magnetic fields)

VLASOV, K. B.

126-3-24/34

AUTHOR: Vlasov, K. B.

TITLE: On the thermal dynamics of irreversible processes in a polarized magneto-elastic medium. I. (K termodinamike neobratimykh protsessov polyarizovannoy magnetouprugoy sredy. I).

PERIODICAL: "Fizika Metallov i Metallovedeniye" (Physics of Metals and Metallurgy), 1957, Vol.4, No.3, pp. 542-544 (U.S.S.R.)

ABSTRACT: The author considers an isotopic magneto-elastic medium which is polarised in the initial state by a magnetic field H_0 in the direction of the z-axis. It is assumed that deviation of the state of this system from the original one is determined only by the magnetisation vector I_m and the deformation tensor ε_j. The thermal and electric conductivity, hysteresis and a number of other irreversible processes are not taken into consideration. For the given case the equation of Biot, M.A. (1), eq.(1), assumes the form expressed by eq.(3) and by solving it we obtain an equation of "state" for the steady state processes which takes into consideration the irreversibility of the processes, namely:

$$H_m = \gamma^{\varepsilon}_{mn} I_n + h_{mj} \varepsilon_j ; \sigma_i = \hat{h}_{ni} I_n + c^I_{ij} \varepsilon_j$$

Card 1/2

This equation describes the magnetic, mechanical and the

126-3-24/34

On the thermal dynamics of irreversible processes in a polarised magneto-elastic medium. I. (Cont.)

magneto-mechanical phenomena in a polarised magnetically elastic medium without taking into consideration heat and electric conductivity and hysteresis. Particularly, it describes the spin-spin relaxation which was first taken into consideration thermodynamically by Shaposhnikov, I.G.(5), the magnetic resonance and the magneto-mechanical resonance to which attention was first drawn by Al'tshuler, S.A.(6).

Card 2/2

Acknowledgments are made to S. V. Vonsovskiy for his continued interest in this work.

SUBMITTED: March 21, 1957.

ASSOCIATION: Institute of Metal Physics Ural Branch of the Ac.Sc., U.S.S.R. (Institut Fiziki Metallov Ural'skogo Filiala AN SSSR).

AVAILABLE: Library of Congress

126-5-3-1/31

AUTHOR: Vlasov, K. B.

TITLE: Thermodynamics of Irreversible Processes in a Polarized Magneto-Elastic Medium. II (K termodinamike neobratimykh protsessov polyarizovannoy magnetouprugoy sredy. II)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1957, Vol V, Nr 3, pp 385-9 (USSR)

ABSTRACT: Visvanathan's and Laval's treatments of the elastic properties of crystalline media of low symmetry are applied to an initially isotropic magneto-elastic medium (one that becomes magnetic under stress), polarized by a magnetic field. The treatment is theoretical; eqs.(1) relate to reversible processes, the usual international symbols for stress, magnetic field, etc. being used. Eqs.(2) relate to non-equilibrium processes, where the deviations from equilibrium are small; Eqs.(3) are the Onsager equations for the kinetic coefficients. The condition that Eqs.(1) are invariant against rotation about the special direction are then applied, and the theoretical consequences developed. The physical natures of the 54 parameters required to define the state of strain are not interpreted.

Card 1/1 There are 7 references, 3 of which are Soviet and 4 English.

Inst. of Metal Physics, Ural Br. AS USSR

VLASOV, K. B.

48-8-15/25

AUTHOR: Vlasov, K. B.

TITLE: Some Problems Connected With the Theory of Brittle Ferromagnetic Magnetostrictive Domains (Nekotoryye voprosy teorii uprugikh ferromagnitnykh (magnitostriktsionnykh) sred)

PERIODICAL: Izvestiya AN SSSR, Ser.Fiz.,1957, Vol. 21, Nr 8, pp. 1140-1148 (USSR)

ABSTRACT: For the purpose of solving problems concerning magnetomechanical transformations, it is necessary that equations of electrodynamics, of the elasticity theory, and equations of state are available. Mechanical stresses in a ferromagneticum form (in general) an asymmetric tensor. According to Brown there nevertheless is a possibility of introducing a quasi-symmetric stress tensor ($\sigma_{ij} = \sigma_{ji}$) by somewhat changing the equations of elasticity. Accordingly, a symmetric tensor was from the outset assumed in this work. What is required is an approximate equation of state of the brittle ferromagnetic domain by the decomposition of a thermodynamic potential in series development with respect to small parameters, on which occasion the quasistatistical processes were followed. As a thermodynamic initial potential the energy of a mass unit was assumed which was decomposed into the order of the components: tensor deformation ε_{ij},--------- a vector component of the specific magnetization M_2 (magnetic moment of the mass unit)

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Some Problems Connected With the Theory of Brittle Ferromagnetic Magnetostrictive Domains. 48-8-15/25

according to temperature changes ΔT up to terms of the quadratic ratio of the values ε_{ij} and ΔT and according to terms of the 6th step M2 near the state $\varepsilon_{ij}=0$, $M_2=0$ and $T=T_0$. According to Brown the modification of the free energy of the mass unit here has the expression: $dF=H_2dM_2+v(\sigma_{ij}d\,\varepsilon_{ij})-sdT$, where H_2 vector component of the voltage of the magnetic field, v -specific volume = $1/\varrho = v_0(1+\delta_{ka}\varepsilon_{ka})$, ϱ- elasticity, and s -entropy of the mass unit. In the course of computations, which here comprise 45 formulae, we here find:

$$\varepsilon_j - {}^{oHT}_{j} = s^{HT}_{ij}\sigma_i - d^{*T}_{mj}H_m - \alpha^{*H}_{j}\Delta T,$$

$$J_n - J^{o\sigma T}_{n} = -d^{T}_{ni}\sigma_i + \chi^{\sigma T}_{nm}H_m - q^{*\sigma}_{n}\Delta T,$$

$$\Delta Q - \Delta Q^{\sigma H}_{o} = -T\alpha^{H}_{i}\sigma_i - Tq^{\sigma}_{m}H_m - \varrho C^{\sigma H}\Delta T.$$

Conclusions: The tensor constant of the equations of state are expressed by corresponding tensor constants which are able to replace one another. These values are obtained automatically in the course of the process of the algebraic transformation to the new inconstant variables. These values are similar to conditions of the corresponding stable values in thecase of piezoelectrica or

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Some Problems Connected With the Theory of Brittle Ferromagnetic Magnetostrictive Domains. 48-8-15/25

polarized seignette electrica. If, instead of T the entropy S is inserted as independent variable, the ratio between isometric and adiabatic values of the corresponding tensor stable values can be obtained. The data obtained here may be obtained for electrostriction domains of the keramic type of barium titanium. For this purpose a corresponding replacement of values is carried out. There are 7 references, 4 of which are Slavic.

ASSOCIATION: Insitute for Metal Physics of the Ural Branch AN USSR (Institut fiziki metallov Ural'skogo filiala AN SSSR)

AVAILABLE: Library of Congress

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SOV/137-59-5-10677

Translation from: Referativnyy zhurnal, Metallurgiya, 1959, Nr 5, p 174 (USSR)

AUTHOR: Vlasov, K.B.

TITLE: Some Problems on the Theory of Mechanical, Magnetic, Thermal, Magneto-mechanical, Thermomagnetic, and Thermoelastic Properties of a Magnetoelastic Medium

PERIODICAL: Tr. In-ta fiz. metallov Ural'skiy fil, AS USSR, 1958, Nr 20, pp 71 - 89

ABSTRACT: Polycrystalline ferromagnetic substances, which can be considered as magnetic and elastic isotropic media, are used for the manufacture of magneto-mechanical converter cores, operating in the range of ultrasonic frequencies. The author derives relations necessary for the calculation of these converters and for the solution of analogous problems. By modifying the elasticity equations, the elasticity tensor is obtained which is also symmetrical in the case of a magnetopolarized medium with a magnetization resultant. The author derived equations of state for a quasi-dynamic case by an approximation method. He used thermo-dynamic

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81506

SOV/137-59-5-10677

Some Problems on the Theory of Mechanical, Magnetic, Thermal, Magneto-mechanical, Thermomagnetic, and Thermoelastic Properties of a Magnetoelastic Medium

relations and considerations of the symmetry of magnetic non-polarized and polarized media, taking into account the thermal effect and the arbitrary deformation. Free energy was selected as an initial thermo-dynamic potential. Some cases are analyzed where the intensity of the magnetic field and the voltage are used as independent variables (of magnetization, deformation and temperature). Considering that the presence of polarization magnetization causes reduced symmetry, it follows from the equations obtained that the properties of the polarized magnetoelastic medium are characterized by a greater number of tensor constants than in the case of a nonpolarized medium, whereby the number of independent components increases. Equations of state are obtained for the particular case of one-sided compression or extension along the direction of polarization magnetization or for the application of an alternating magnetic field in the same direction. With the use of the aforementioned equations of state, equations can be obtained which are usually applied to the calculation of magnetostriction con-

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81506
SOV/137-59-5-10677

Some Problems on the Theory of Mechanical, Magnetic, Thermal, Magneto-mechanical, Thermomagnetic, and Thermoelastic Properties of a Magneto-elastic Medium

verters. Their solutions are represented merely by longitudinal vibrations of the type of one-sided extensions or compressions. More complicated vibration types such as transverse, torsional vibrations etc., can also be obtained by general forms of equations. To facilitate practical calculations, the vector of the magnetic induction is introduced instead of the vector of magnetization as a value describing the magnetic state. Equations of state are also derived for the dynamic case. Methods of irreversible thermodynamics are used. The number of components characterizing the magneto-elastic polar[illegible] medium increases. There are 22 bibliographical titles.

P.S.

Card 3/3

SOV/81-59-5-14450

Translation from: Referativnyy zhurnal, Khimiya, 1959, Nr 5, p 35 (USSR)

AUTHOR: Vlasov, K.B.

TITLE: On Several Questions Concerning the Quantum-Mechanical and Phenomenological Theory of Ferromagnetism, Anti-Ferromagnetism and Ferrimagnetism

PERIODICAL: Tr. In-ta fiz. metallov. Ural'skiy fil. AS USSR, 1958, Nr 20, pp 91 - 94

ABSTRACT: A review. There are 34 titles in the bibliography.

A.N.

Card 1/1

SOV/58-59-10-22821

Translation from: Referativnyy Zhurnal, Fizika, 1959, Nr 10, p 145 (USSR)

AUTHORS: Shur, Ya.S., Luzhinskaya, M.G., Vlasov, K.B., Shiryayeva, O.I., Zaykova, V.A.

TITLE: On the Relation Between the Magnetic Properties and Sensitivity of Magnetostrictive Receivers

PERIODICAL: Tr. In-ta fiz. metallov. Ural'skiy fil. AN SSSR, 1958, Nr 20, pp 131-140

ABSTRACT: The authors made an experimental study of the relation between the sensitivity of magnetostrictive receivers and the magnetic characteristics of a number of materials out of which they were produced. For this study soft magnetic materials were used that possess very dissimilar magnetic and magnetostrictive properties. It is demonstrated that for every receiver the greatest magnitude of sensitivity is attained at those values of the magnetizing field and that magnitude of induction, at which the greatest value of the product $\mu_{\sim} \cdot (\partial\lambda/\partial B)$ is obtained for the given material. The sensitivity of receivers made of different kinds of materials, measured at optimum polarization, is proportional to the

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On the Relation Between the Magnetic Properties and Sensitivity of Magnetostrictive Receivers

magnitudes $\mu_{\sim} \cdot (B_{opt}) (\partial\lambda/\partial B) (B_{opt})$, $\mu_{\sim} \cdot (B_{opt}) (\lambda_s/I_s)$, or $\mu_o(\lambda_s/I_s)$ obtained on these materials. It follows that if the static magnetic characteristics μ_o, λ_s, and I_s of the materials are known, then, using the correlation $e_{max} \sim \mu_o (\lambda_s/I_s)$, it is possible to make an approximate comparative estimate of the magnitude of sensitivity of magnetostrictive receivers produced from these materials. Cf abstract 22801.

V.A. Zaykova

Card 2/2

AUTHOR: Vlasov, K. B. SOV/48-22-10-1/23

TITLE: Dynamic Constants of Magnetically Polarized Magnetoelastic (Magnetostrictive) and Electrically Polarized (Electrostrictive) Media (Dinamicheskiye postoyannyye magnitno polyarizovannykh magnetouprugikh (magnitostriktsionnykh) i elektricheski polyarizovannykh (elektrostriktsionnykh) sred.

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1958, Vol 22, Nr 10, pp 1159 - 1167 (USSR)

ABSTRACT: In the present paper the author gives derivations of equations that describe the dynamic behavior of magnetically polarized magnetostrictive and electrically polarized electrostrictive media. These equations also consider the non-equilibrium processes taking place in these media according to the method of the so-called thermodynamics of irreversible processes. In order to solve the problem of the dynamic behavior of the magnetostrictive medium for the general case of the steady (and not only of the quasisteady) processes either the equations (5) for I_t and $\frac{\partial u_i}{\partial x_k}$ together with Maxwell's (Maksvell) equations, considering the theory of elasticity and the relation (12) must be solved; or the

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Dynamic Constarts of Magnetically Polarized Magnetoelastic (Magnetostrictive) and Electrically Polarized (Electrostrictive) Media

SOV/48-22-10-1/23

system of equations (17) together with Maxwell's equations and the equations of the theory of elasticity must be solved. The obtained equations describe a large number of magnetical, mechanical, and magneto-mechanical phenomena, e.g. the phenomenon of the magnetic and magneto-mechanical resonance (Ref 14), the spin-spin relaxation (Ref 15), the influence of the mechanical state of the medium upon the resonance-anisotropy of gyromagnetic phenomena etc. Equations are also given for the calculation of the dynamic behavior of electrically polarized electrostrictive media. In the present paper the possibility of an excitation of the dynamical conditions of internal degrees of freedom is not considered. There are 16 references, 10 of which are Soviet.

ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR (Institute of Metal Physics, AS USSR)

Card 2/2

AUTHORS: Shur, Ya. S., Luzhinskaya, M. G., Vlasov, X. B., Shiryayeva, O. I., Zaykova, V. A. SOV/48-22-10-18/23

TITLE: On the Dependence of the Sensitivity of Magnetostrictive Receivers on Their Magnetostrictive Characteristics (O zavisimosti chuvstvitel'nosti magnitostriktsionnykh priyemnikov ot ikh magnitnykh kharakteristik)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1958, Vol 22, Nr 10, pp 1259 - 1262 (USSR)

ABSTRACT: According to theoretical calculations (Refs 1 - 3) the sensitivity of the magnetostrictive receiver can be related to the magnetic characteristics of the material of the receiver as follows:

$$e \sim \mu_{\sim} \frac{\partial \lambda}{\partial B} \quad (1)$$

$$e_{max} \sim \mu_{\sim} (B_{opt.}) \frac{\lambda_s}{I_s} \quad (2)$$

$$e_{max} \sim \mu_0 \frac{\lambda_s}{I_s} \quad (3)$$

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On the Dependence of the Sensitivity of Magnetostrictive Receivers on Their Magnetostrictive Characteristics

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The symbols denote: e - sensitivity, $\mu_{\sim}$- apparent permeability, λ- magnetostriction, B - induction, λ_s - saturation magnetostriction, I_s - saturation magnetization, μ_o- initial permeability, e_{max} - maximum sensitivity of the receiver at a certain optimum value of the induction of the polarization B_{opt}. In the present paper the above-mentioned theoretical relations and their possible application in the selection of the material for magnetostrictive receivers were checked by experiment. Materials with widely differing magnetic properties were investigated. The measurements showed that after different treatment the alloys exhibited widely differing magnetic properties and sensitivities. From experimental data can be seen that in the case of a modification of the magnetic state of the concerned receiver its sensitivity varies according to formula (1). The relations (2) and (3), which relate the maximum values of the receiver sensitivity of various alloys, are satisfied less exactingly. One of the reasons for this disagreement might be errors in the experimental determination of various characteristics.

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SOV/48-22-10-18/23

On the Dependence of the Sensitivity of Magnetostrictive Receivers on Their Magnetostrictive Characteristics

The results show that when formula (3) is employed an approximate comparative estimation of the sensitivity of the material can be given if the values of μ_0, λ_s, and I_s are known. Detailed results of this work are published in reference 3. There are 3 figures and 3 references, 1 of which is Soviet.

ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR (Institute of Metal Physics, AS USSR)

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67724

AUTHOR: Vlasov, K. B.

SOV/126-7-3-25/44

TITLE: On the Rotation of the Plane of Polarization of Elastic Waves in Magnetically Polarized Metals (O vrashchenii ploskosti polyarizatsii uprugikh voln v magnitno-polyarizovannykh metallakh)

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 7, Nr 3, pp 447-448 (USSR)

ABSTRACT: The present note discusses the propagation of a plane transverse elastic wave ($\tilde{u} = \tilde{u}_o \exp[i(\omega t - kz)]$) in a metal in the direction of the polarizing magnetic field H_o (directed along the z-axis). In the above expression $\tilde{u} = \tilde{u}_x + ju_y$, where u_i are the components of the displacement vector for points inside the elastic medium. The propagation of this wave is accompanied by a change in the electron distribution function f. On solving the kinetic equation for the electrons and using Maxwell's equations (Refs 1 and 2) it is possible to obtain the distribution function and hence calculate the mechanical stresses which arise as a result of the change in the distribution function (Eq 1). In Eq (1)

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SOV/126-7-3-25/44

On the Rotation of the Plane of Polarization of Elastic Waves in Magnetically Polarized Metals

n is the number of free electrons per cc and m, e, v, ℓ and τ are the mass, charge, velocity, mean free path and mean free time, respectively. For low frequencies when $k\ell \ll 1$ or for strong fields, i.e. when $\omega_c \tau \gg k\ell$, Eq (1) assumes the simple form given by Eq (2). Using these results an expression is obtained for the rotation constant (Eqs 3 and 4). It is concluded from these results that in the field of say 10^4 oersted the rotation of the plane of polarization should be at least a few tenths of a radian for a path of 10 cm, provided the frequencies are not too large. Acknowledgment is made to S. V. Vonsovskiy for his interest in the present work. There are 3 references, 1 of which is Soviet and 2 English.

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of Physics of Metals, Ac.Sc., USSR)

SUBMITTED: December 19, 1958

4

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24(3)

AUTHOR: Vlasov, K. B. SOV/48-23-3-28/34

TITLE: On the Report by N. A. Baranov and Ya. S. Shur (Po dokladu N. A. Baranova i Ya. S. Shur). "On the Problem of the Temperature Dependence of Magnetic Properties of Highly Coercive Alloys" (Vol 22, Nr 10, p 1272) ("K voprosu o temperaturnoy zavisimosti magnitnykh svoystv vysokokoertsitivnykh splavov" (t.22, No 10, str. 1272))

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 3, p 418 (USSR)

ABSTRACT: The specific character of the temperature dependence of the coercive force H_c, i.e. the existence of a maximum on the curve of the dependence on H_c, may be explained in several heterogeneous, magnetically hard materials by the assumption that H_c in these materials is chiefly determined by the anisotropy-energy of the magnetic dispersion fields (inner demagnetizing fields). This anisotropy may be due to the fact that the separations of some of the phases have a stretched shape, or that their distribution in space has an anisotropic character.

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On the Report by N. A. 'aranov and Ya. S. Shur. SOV/48-23-3-28/34
"On the Problem of the Temperature Dependence of Magnetic Properties of Highly Coercive Alloys" (Vol 22, Nr 10, p 1272)

If the separating phase as well as the matrix are ferromagnetic, the energy of the dispersion fields will be proportional to the square of the difference of spontaneous magnetization of these phases $(I_{s1} - I_{s2})^2$. This energy will - in the existence of its anisotropy - take over the role of the anisotropy constant in the formula for H_c. From the figure can be seen that in the case of different Curie points θ_1 and θ_2 of the two phases the difference $(I_{s1} - I_{s2})$ and, consequently, also the coercive force will increase with temperature within a certain range of temperature. There is 1 figure.

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24(3)

AUTHORS: Vlasov, K. B., Ishmukhametov, B. Kh. SOV/56-36-4-49/70

TITLE: On the Rotation of the Polarization Plane of Elastic Waves in a Magnetically Polarized Medium (O vrashchenii ploskosti polyarizatsii uprugikh voln v magnitno-polyarizovannoy srede)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 4, pp 1301-1303 (USSR)

ABSTRACT: In the present "Letter to the Editor" the authors investigate the propagation of plane elastic waves in a magnetically polarized medium with uniaxial symmetry. The case is investigated in which the constant polarized field H_0 is orientated along the symmetry axis x_3. In disregard of magnetomechanical effects, the propagation of these waves along H_0 is theoretically investigated. It was found that during propagation along H_0 the plane polarized transversal elastic waves experience a rotation of the polarization plane round the angle φ. For φ an expression of the form $\varphi = \kappa H_0 x_3 = Bk^{(0)2}x_3/2(\rho c_{44})^{1/2}$ is obtained, $k^{(0)} = (k^{(1)} + k^{(2)})/2$, B plays the part of the tensor component of the elasticity modulus; it may be complex.

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On the Rotation of the Polarization Plane of Elastic Waves in a Magnetically Polarized Medium SOV/56-36-4-49/70

For the calculation of φ its real part is used. The imaginary part of B supplies absorption coefficients for the left- and right-circularly polarized waves. During passage of the linearly polarized wave an ellipticity occurs (a circular magnetic dichroism of the transversal elastic waves) beside the rotation of the polarization plane. For the ratio of the axes of this ellipse it holds that $b/a = \pm \text{th Im}\left\{Bk^{(0)2}x_3/\left[2(\rho c_{44})^{1/2}\right]\right\}$. The authors finally thank S. V. Vonsovskiy for his interest in this work. There are 3 references, 2 of which are Soviet.

ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR (Institute for Metal Physics of the Academy of Sciences, USSR)

SUBMITTED: October 20, 1958

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24(3), 24(1)

AUTHORS: Vlasov, K. B., Ishmukhametov, B. Kh. SOV/56-37-3-23/62

TITLE: Rotation of the Polarization Plane of Elastic Waves in Magnetically Polarized Magnetoelastic Media

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 3(9), pp 745 - 749 (USSR)

ABSTRACT: By using an equation (1) derived by Vlasov in reference 1, which describes the elastic, magnetic, and magnetoelastic properties of a magnetoelastic medium, the authors in the present paper investigate the propagation of magnetoelastic waves in magnetically polarized media, viz. for the special case of a homogeneous uniaxially symmetric medium. It is shown that the magnetoelastic wave propagating along a symmetry axis consists of three waves: a longitudinal wave and two circularly polarized waves, the propagation rate of which is different and depends on the magnetic state of the medium (magnetization or polarization field). The latter circumstance should lead to rotation of the polarization plane of linearly polarized elastic waves. The analysis is based on the use of the phenomenological "state equations",

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Rotation of the Polarization Plane of Elastic Waves in Magnetically Polarized Magnetoelastic Media SOV/56-37-3-23/62

which describe the dynamical properties of magnetoelastic media; displacement currents and conductivity currents were taken into account. For some particular types of magneto-elastic media some details concerning the physical nature of the constants determining the rotation of the polarization plane are discussed. The frequencies at which an appreciable effect may be expected are estimated as $\sim 10^{-9}\text{sec}^{-1}$ for ferromagnetics. There are 10 references, 6 of which are Soviet.

ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR (Institute of Metal Physics of the Academy of Sciences, USSR)

SUBMITTED: March 28, 1959

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S/056/60/038/03/20/033
B006/B014

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AUTHOR: Vlasov, K. B.

TITLE: Equations of State Defining the Magnetoelastic Properties of Ferromagnetic Single Crystals

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 3, pp. 889-894

TEXT: In earlier papers (Refs. 1-3) the author set up dynamic equations, termed "equations of state", which define the magnetoelastic properties of a magnetically polarized medium. O· the strength of these equations he further proved that the polarization plane of elastic transverse waves rotates during their propagation along the axis of magnetization. In order to investigate this effect more thoroughly it is necessary to study an actually occurring case (a ferromagnetic single crystal in the present paper). The following assumptions are made: 1) The ferromagnetic single crystal has a hexagonal symmetry, and the axis of weak magnetization coincides with the sixth-order axis. 2) The crystal is finitely large, and the processes taking place therein are equilibrium processes. 3) The

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Equations of State Defining the Magnetoelastic Properties of Ferromagnetic Single Crystals S/056/60/038/03/20/033 B006/B014

elastic deformations occurring in the crystal and the variations in magnetization are small. The equations of state are derived proceeding from the condition that the thermodynamic potential is a minimum. In the case of inhomogeneous deformations, the equilibrium values of mechanical stress and magnetic field strength are interrelated by the equations of state not only with the magnetization vector and the deformation tensor but also with the rotation tensor which determines the orientation of the volume element under consideration. On the basis of the results obtained some conclusions are drawn as to the features of the propagation velocity and the rotation of the polarization plane of transverse elastic waves in ferromagnetic materials. In this respect, the relations derived are also applied to practical examples. Concerning the rotation of the polarization plane of elastic waves it is shown that rotation is determined not only by the constant of magnetostriction but also by that of crystallographical magnetic anisotropy. For the velocity c_t the author obtained an expression slightly different from that found by A. I. Akhiyezer, V. G. Bar'yakhtar, and S. V. Peletminskiy, which is due to the fact that the rotation of volume elements was taken into account. This is exemplified by the velocity c_t of elastic waves propagating within a magnetodielectric.

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82419

Equations of State Defining the Magnetoelastic Properties of Ferromagnetic Single Crystals

S/056/60/038/03/20/033
B006/B014

There are 9 references, 7 of which are Soviet.

ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR (Institute of Metal Physics of the Academy of Sciences, USSR)

SUBMITTED: August 14, 1959

Card 3/3

S/0048/64/028/003/0423/0429

ACCESSION NR: AP4023383

AUTHOR: Vlasov, K.B.; Volkenshteyn, N.V.; Vonsovskiy, S.V.; Mitsek, A.I.; Turchinskaya, M.I.

TITLE: Unidirectional anisotropy [Report, Symposium on Ferromagnetism and Ferroelectricity held in Leningrad 30 May to 5 June 1963]

SOURCE: AN SSSR. Izvestiya. fizicheskaya, v.28, no.3, 1964, 423-429

TOPIC TAGS: ferromagnetism, antiferromagnetism, cubic lattice ferromagnets, unidirectional anisotropy, nickel manganese alloy

ABSTRACT: A substance is said to possess unidirectional anisotropy (UA) when its magnetic properties differ in the two directions of the same crystallographic axis. This phenomenon was first observed by W.H.Mejklejohn and C.P.Bean (Phys.Rev., 105, 904, 1956), who ascribed its appearance in their material to an exchange interaction across the boundaries between ferromagnetic and antiferromagnetic phases. Two of the present authors have suggested that UA could appear in a single ferromagnetic substance provided a weakly interacting sub-lattice constituting an antiferromagnetic subsystem were present, and they have given a thermodynamic discussion of a uni-

ACCESSION NR: AP4023383

axial system of this sort (K.B.Vlasov and A.I.Mitsek, Fizika metallov i metallovedeniye,14,487,498,1962). In the present paper the theoretical treatment is extended to systems with cubic symmetry. UA is possible when the coupling between the antiferromagnetic vector and the crystal lattice is stronger than the coupling between the ferromagnetic and antiferromagnetic subsystems. The states with UA are metastable and can be altered by application of a magnetic field exceeding the threshold field of the antiferromagnetic subsystem. UA was observed in disordered Ni-Mn alloys (28.1 atomic percent Mn) at temperatures below 20.4°K. The magnetization was investigated in the [111] direction, and the UA was evinced by a characteristic bend in the magnetization curve or by a horizontal shift of the hysteresis loop. Samples that were cooled in the presence of a magnetic field showed UA; those that were cooled in the zero field did not. The samples were subjected to an intense pulsed magnetic field (up to 170 kOe) in an effort to alter their UA. At 4.2°K a field of 10 kOe appreciably altered the UA of a sample that had been cooled in a field of 1300 Oe, and a field of 130 kOe changed its sign. A sample that was cooled in the absence of a magnetic field and initially showed no UA, acquired UA when subjected to magnetic fields greater than 60 kOe. The degree of UA (as measured by the shift of the hysteresis loop) was a linear function of the field for inducing fields greater than 60 kOe. These fields are of the order of the threshold fields for typi-

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ACCESSION NR: AP4023383

cal cubic antiferromagnetics. The experimental results thus support the hypothesis that the investigated alloys possess both ferromagnetic and antiferromagnetic states. Orig. art. has: 14 formulas and 3 figures.

ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR (Institute of Physics of Metals, Academy of Sciences, SSSR); Ural'skiy gosudarstvenny*y universitet (Ural State University)

SUBMITTED: 00 DATE ACQ: 10Apr64 ENCL: 00

SUB CODE: PH NO REF SOV: 005 OTHER: 003

Card 3/3

ACCESSION NR: AP4013105 S/0126/64/017/001/0152/0155

AUTHORS: Vlasov, K. B.; Filippov, B. N.

TITLE: Resonance phenomena in the rotation of the plane of polarization and circular magnetic dichroism of elastic waves in metals

SOURCE: Fizika metallov i metalloved., v. 17, no. 1, 1964, 152-155

TOPIC TAGS: polarization plane, magnetic dichroism, elastic wave, crystallographic direction, absorption coefficient, mean free path, fermi surface, cyclotron frequency, plasma frequency, electrical conductivity tensor

ABSTRACT: Starting with the model of a free electron in a strong magnetic field and using the results of K. B. Vlasov and B. N. Filippov (ZhETF 1963, 44, 922), the following equations were derived for the coefficient of absorption of circularly polarized waves and the constant of rotation of the plane of polarization of an initially linearly polarized wave

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$$a^{\pm} = \frac{Nm}{\rho s_l \tau} a_1^{\pm}; \quad \varkappa = \frac{eN}{2\rho s_l c} \varkappa_1,$$

$$\varkappa_1 = \frac{\omega^2}{\omega_0^2} \frac{A}{D}; \quad a_1^{\pm} = \frac{\omega^2}{\omega_0^2} \frac{B^{\pm}}{D};$$

$$A = \left(\frac{\omega^2}{\omega_0^2} - 1\right) - a^2 \left(3\frac{\omega^2}{\omega_0^2} - 1\right) - \gamma^2 \left(\frac{\omega^2}{\omega_0^2} - 2\right);$$

$$D = \left(\frac{\omega^2}{\omega_0^2} - 1\right)^2 - 4a^2 \frac{\omega^2}{\omega_0^2} \left(\frac{\omega^2}{\omega_0^2} - 1\right) + 2\gamma^2 \left(3\frac{\omega^2}{\omega_0^2} - 1\right);$$

$$B^{\pm} = \left(\frac{\omega}{\omega_0} \mp 1\right)^2 + a^2 \left(1 \mp 2\frac{\omega}{\omega_0} + 3\frac{\omega^2}{\omega_0^2} \mp 2\frac{\omega^3}{\omega_0^3}\right) - \gamma^2 \left(\frac{\omega^2}{\omega_0^2} \mp 4\frac{\omega}{\omega_0} + 2\right);$$

$$\omega_0 = \frac{s_l^2}{c^2} \frac{\omega_p^2}{\Omega}; \quad a = \frac{1}{\sqrt{5}} \frac{s_l v_0}{c^2} \frac{\omega_p^2}{\Omega^2}; \quad \omega_p^2 = \frac{4\pi N e^2}{m}; \quad \gamma = (\Omega\tau)^{-1}; \quad \Omega = \frac{e}{mc} H,$$

Here m, e, τ, l, v_0, Ω, r_c, ω_p, N are respectively the mass, charge, time, mean free path, velocity at the Fermi surface, cyclotron frequency, radius of

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the cyclotron orbit, plasma frequency of the electron, and the number of electrons per unit volume; ω, k, λ, s_t are the frequency, wave vector, wavelength, and the velocity of propagation of transverse elastic waves. Resonance is observed in the neighborhood of $\omega/\omega_0 = 1$. As shown in Fig. 1 on the Enclosure, in the neighborhood of resonance, $\varkappa$ passes through zero. This plot corresponds to $s_t = 10^5$ cm/sec, $v_0 = 10^8$ cm/sec, $\omega_p = 10^{15}$ sec^{-1}, $\tau = 10^{-11}$ sec, $H = 10^5$ oersteds, and $\omega = 10^8$ sec^{-1}. It was shown that if at some relatively weak field (still strong enough so as not to violate the original assumptions) the rotation of the plane of polarization was positive, then at a certain value of the magnetic field given by

$$H_1 = 5^{-1/6}\frac{mc}{e}\frac{(v_0 s_t)^{1/2}}{c}\omega_p$$

it vanishes, and then it becomes negative. It was also shown that resonance must be observed when the wavelength of elastic waves becomes commensurate with the penetration depth for electromagnetic waves. Orig. art. has: 9 formulas and 2 graphs.

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of Physics of Metals, AN SSSR)

ACCESSION NR: AP4013105

SUBMITTED: 05Oct63

ENCL: 01

SUB CODE: EM,MM

NO REF SOV: 002

OTHER: 002

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ACCESSION NR: AP4013105

ENCLOSURE: 01

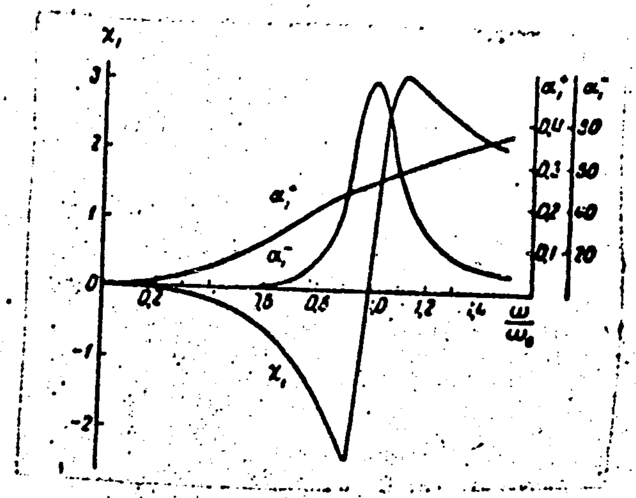

Fig. 1. Dependence of χ_1, α_1^+, and α_1^- on ω/ω_0

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L 42203-66 EWT(1)/T/EWP(k)

ACC NR: AP6007347 SOURCE CODE: 0126/66/021/002/0176/0186

AUTHOR: Vlasov, K. B.

ORG: Institute of the Physics of Metals, AN SSSR (Institut fiziki metallov AN SSSR)

TITLE: Theory of the rotation of the plane of polarization and absorption of transverse ultrasound in magnetically polarized metals with arbitrary electron dispersion

SOURCE: Fizika metallov i metallovedeniye, v. 21, no. 2, 1966, 176-186

TOPIC TAGS: ultrasound absorption, ultrasonic absorption, magnetic field, circular polarization

ABSTRACT: A theoretical calculation of the constants characterizing the absorption $\alpha^{\pm}$ and the rotation of the plane of polarization χ of circularly polarized elastic waves (ultrasound) propagating in magnetically polarized metals with an arbitrary conduction electron dispersion law in the regions of strong magnetic fields is presented. The calculation is based on previously published work by K. B. Vlasov and B. N. Filippov (FMM, 1964, 18, 333). The results of the calculation are summarized graphically. It is concluded that, in the case of lattices having cubic or hexagonal symmetry, the dependence of the absorption and rotation constants for wave propagation along the four- and six-fold axes respectively is similar to the propagation of ultrasound in metals whose conduction electrons may be described by a model for free electrons. It is also shown that if the direction of transverse sound

Card 1/2 UDC: 539.292:534; 538.65

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ACC NR: AP6007347

propagation and the direction of the magnetic field (which is parallel to the latter) do not coincide with the principal crystal axes a strong anisotropy in $\alpha^{\pm}$ and $\varkappa$ should result. Orig. art. has: 1 graph and 55 equations.

SUB CODE: 20/ SUBM DATE: 15Mar65/ ORIG REF: 010/ OTH REF: 003

Card 2/2 af

L 07111-67 EWT(l)/EWT(m)/EWP(t)/ETI/EWP(k) IJP(c) JD

ACC NR: AP6029103 SOURCE CODE: UR/0048/66/030/006/0943/0944

AUTHOR: Vlasov, K.B.

ORG: Institute of Metal Physics, Academy of Sciences, SSSR (Institut fiziki metallov Akademii nauk SSSR)

TITLE: Spatial dispersion of the velocity of ultrasound in ferromagnets having domain structure /Report, All-Union Conference on the Physics of Ferro- and Antiferromagnetism held 2-7 July 1965 in Sverdlovsk/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya. v. 30, no. 6, 1966, 943-944

TOPIC TAGS: ferromagnetic structure, magnetic domain structure, ultrasonic velocity

ABSTRACT: It is pointed out that the velocity of ultrasound in a ferromagnet should be different, depending on whether the wavelength is long or short compared with the dimensions of the domains, and it is suggested that this dispersion of ultrasound be employed to measure the domain size. The ultrasonic dispersion is due to the fact that the velocity of ultrasound is determined in part by the susceptibility of the material. When the wavelength is long compared with the domain size it is the bulk susceptibility that is significant, to which both rotation and domain wall displacement processes contribute. When, on the other hand, the wavelength is much smaller than the domains, the significant susceptibility is that which obtains within the domains, to which only rotation processes contribute. It is also pointed out that in

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ACC NR: AP6029103

some cases the dispersion can be masked by magnetic effects associated with the non-vanishing of the divergence of the variable portion of the magnetization excited by the ultrasound; such a case is that in which a longitudinal ultrasound wave propagates parallel to the magnetization. Orig. art. has: 4 formulas.

SUB CODE: 20 SUBM DATE: 00 ORIG. REF: 001

Card 2/2

L 13896-66 EWT(1)
ACC NR: AP5018852 SOURCE CODE: UR/0126/65/020/001/0003/0011

AUTHOR: Vlasov, K. B.

ORG: Institute of Physics of Metals AN SSSR (Institut fiziki metallov AN SSSR)

49
B

TITLE: Associated magnetoelastic waves in anisotropic ferrodielectrics

SOURCE: Fizika metallov i metallovedeniye, v. 20, no. 1, 1965, 3-11 21,44,55

TOPIC TAGS: ferroelectric material, dielectric material, magnetic anisotropy, wave mechanics, ultrasonic wave

ABSTRACT: The author considers propagation and absorption of longitudinal elastic waves and transverse circularly polarized elastic and magnetoelastic waves in a ferrodielectric with cubic symmetry. A dispersion equation is derived for wave propagation and absorption on the assumption that there are no free electric charges in the ferrodielectric and that it does not have spontaneous electric polarization. The equation is simplified by disregarding conduction and displacement currents. The equation takes account of variations in the intensity of magnetization due to changes in the density of the ferrodielectric medium. The material is assumed to have

UDC: 539.294:538+539.294:3.01

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L 13896-66

ACC NR: AP5018852

a positive constant of crystalline anisotropy (the axis of preferential magnetization is parallel to the axis of four-fold symmetry) and to be located in a polarizing magnetic field also oriented along this axis. Formulas are derived for the phase velocity and absorption of these waves and for the angles through which the plane of polarization rotates during transmission and reflection of ultrasonic waves. It is found that at low temperatures or high frequencies where the module of the specific magnetic moment is nearly constant, variations in the velocity of longitudinal ultrasonic waves are dependent only on changes in the intensity of magnetization due to variations in the density of the material. The formulas derived imply that association is possible between transverse elastic and magnetic oscillations in anisotropic ferrodielectric media as a result of the rotation of volummetric elements caused by the elastic waves. These rotations result in localized variable effective fields of crystalline anisotropy which define a force pair acting from the side of magnetization on the crystalline lattice (and vice versa). Orig. art. has: 63 formulas.

SUB CODE: 20/ SUBM DATE: 17Sep64/ ORIG REF: 009/ OTH REF: 003

Card 2/2

VLASOV, K.B.

Coupled magnetoelastic waves in anisotropic ferrodielectrics. Fiz. met. i metalloved. 20 no.1:3-11 Jl '65. (MIRA 18:11)

1. Institut fiziki metallov AN SSSR.

VLASOV, K.B.; [illegible]PPOV, B.N.

Certain properties of tensors determining the characteristics of propagation and absorption of ultrasonic waves in metals in a strong magnetic field. Fiz.met. i metalloved. 20 no.2:173-178 Ag '65. (MIRA 18:9)

1. Institut fiziki metallov AN SSSR.

L 60444-65 EWT(1)/EWT(m)/T/EWP(t)/EWP(b)/EWA(c) Pg-4/Pi-4/Pl-4 GG/LHB/JD

AUTHOR: Vlasov, K. B.

TITLE: Rotation of the plane of polarization of reflected elastic waves and generation of reflected electromagnetic waves when ultrasonic vibrations act on a magnetically polarized conductor

SOURCE: Fizika metallov i metallovedeniye, v. 19, no. 6, 1965, 827-834

TOPIC TAGS: **electromagnetic wave reflection, ultrasonic wave, vector analysis,** metal physics, mathematical analysis, magnetic phenomenon, resonant state

[illegible] tion coefficients were [illegible] magnetic waves in polarized conductors. The phenomenon of rotation of the plane of polarization and ellipticity were predicted, as well as the appearance of reflected reverse-polarization of cylindrical electromagnetic waves, when a conductor is sub- [illegible]

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L 60444-65

ACCESSION NR: AP5016523

waves. Theoretical conditions were examined for the reflection and the conduction of electromagnetic and transverse elastic waves, normally coincident on boundaries

media (e.g., dielectrics).

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of Physics of Metals, AN SSSR)

EM

NO REF SOV: 012 OTHER: 006

L 1349-66 EWT(1)/EWT(m)/EWP(t)/EWP(b)/EWA(h) JD

ACCESSION NR: AP5021931 UR/0126/65/020/002/0173/0178
539.292:534;538.65

AUTHOR: Vlasov, K.B.; Filippov, B.N.

TITLE: Certain properties of the tensors determining the features of the propagation and adsorption of the ultrasound in metals within a strong magnetic field

SOURCE: Fizika metallov i metallovedeniye, v. 20, no. 2, 1965, 173-178

TOPIC TAGS: tensor field, inverse tensor field, ultrasonic propagation, magnetic field, magnetically polarized metal, rotating polarization plane, ultrasound, asymptotic expression, crystallographic axis, Fermi surface, rot tional constant

ABSTRACT: The article is a continuation of a previous investigation (K.B. Vlasov, B.N. Filippov, ZhETF, 1964, 46, 223), which was concerned with calculating the rotation of the plane of polarization of the ultrasound in magnetically polarized metals with an arbitrary law of variance of electrons for the case of a strong magnetic field, where the characteristic orbital cyclotron radius of electrons is much shorter than their free-path length and the wavelength of the ultrasound. The present investigation is concerned with the features of the propagation and adsorption of the ultrasound during its propagation parallel to a polarizing mag-

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netic field and second-, fourth-, and sixth-order crystallographic axes, as characterized by the inverse tensor field. On the basis of considerations of the general symmetry of the magnetic field and crystals, it is concluded that certain terms of the expansion become zero when the inverse tensor field reaches a certain magnitude. Asymptotic expressions are given for these tensors with respect to closed and open Fermi surfaces and different cases of orientation of the polarizing magnetic field relative to the crystallographic axes in different ranges of variation in ultrasonic frequencies. In particular, it is shown that, under specific conditions, when the magnetic field is oriented along the fourth- or sixth-order crystallographic axes (as well as along the direction of propagation of sound), the rotational constant is determined only by the type of the tensor β_{2331}, which, in its turn, depends on the type of the deformation potential (torque). Orig. art. has: 23 formulas.

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of the Physics of Metals, AN SSSR) 44,55

SUBMITTED: 17Sep64 ENC: 00 SUB CODE: NP, EM

NO SOV REF: 007 OTHER: 000

Card 2/2

VLASOV, K.B.; FILIPPOV, B.N.

Characteristics of the rotation of a polarization plane and the circular magnetic dichroism of ultrasonic waves in metals in a strong magnetic field. Fiz. met. i metalloved. 18 no.3:333-339 S '64. (MIRA 17:11)

1. Institut fiziki metallov AN SSSR.

VLASOV, K.B.; VOLKENSHTEYN, N.V.; VONSOVSKIY, S.V.; MITSEK, A.I.;
TURCHINSKAYA, M.I.

The phenomenon of unidirectional anisotropy. Izv. AN SSSR.
Ser. fiz. 28 no. 3:423-429 Mr '64. (MIRA 17:5)

1. Institut fiziki metallov AN SSSR i Ural'skiy gosudarstvennyy
universitet.

VLASOV, K.B.; FILIPPOV, B.N.

Rotation of the polarization plane and the circular magnetic dichroism of ultrasonic waves in magnetically polarized square law of dispersion. Fiz. met. i metalloved. 16 no.6:801-807 D '63. (MIRA 17:2)

1. Institut fiziki metallov AN SSSR.

VLASOV, K.B.; FILIPPOV, B.N.

Resonance phenomena in the rotation of a polarization plane and the circular magnetic dichroism of elastic waves in metals. Fiz. met. i metalloved. 17 no.1:152-155 Ja '64. (MIRA 17:2)

1. Institut fiziki metallov AN SSSR.

VLASOV, K.B.; FILIPPOV, B.N.

Rotation of the plane of polarization of ultrasound in metals situated in a high magnetic field. Zhur. eksper. i teor. fiz. 46 no.1:223-231 Ja'64. (MIRA 17:2)

1. Institut fiziki metallov AN SSSR.