STEPANOV, A.S.; BURLAKOV, M.L.

Electrophysiological study of fatigue in muscular work. Fiziol. zhur. 47 no.6:735-740 Je *61. (MIRA 15:1)

1. From the Department of Human and Animal Physiology, N.L.Lobatchevski University, Gorki.
(EXERCISE) (FATIGUE) (ELECTROMYOGRAPHY)

ARTEMOV, N.M.; GORYACHEV, Yu.V.; LEBEDEV, O.N.; STEPANOV, A.S.

Effect of bee and cobra venom on the neuromuscular apparatus in cat. Nauch. dokl. vys. shkoly; biol. nauki ne.\$:54-61 *64 (MIRA 17:8)

1. Rekomendovana kafedroy fiziologii cheloveka i zhivotnykh Gor'kovskogo gosudarstvennogo universiteta imeni Lobachevskogo.

STEPANOV, A. S.

Priority of "Russian lock" in surgery. Khirurgiia, Moskva no. 11:66-68 Nov. 1951. (CIML 21:3)

1. Lt-Col, Medical Corps.

STEPANOV, A. S.

"Thrombosis and Thrombophlebitis in Gunshot Wounds of the Lower Extremities and the Pelvis." Leningrad Pediatric Medical Inst., Leningrad, 1955. (Dissertation for the Degree of Candidate in Medical Sciences)

SO: Knizhnaya Lotopis', No. 22, 1955, pp 93-105

EXCERPTA MEDICA Sec 9 Vol 13/4 Surgery Apr 59 2168, THROMBOSIS AND THROMBOPHLEBITIS OF THE LEGS DUE TO GUNSHOT WOUNDS (Russian ted) - Stepanov A. S. - VOES, -MED. ZH、195%。2 (35-39)。 During World War II an extensive dedema was observed not infrequently in legs wounded by gunshot; this condition was regarded as the oedernatous form of an amaerobic infection. Extensive incisions and administration of anti-gangrene serum were without influence on the oedema. Autopsies revealed that thrombosis of the main veins was responsible for the persistent oedema. This induced the author to regard thrombosis and thrombophlebitis of the legs as a complication of shot wounds, Study of 233 case histories, 33 patho-anatomical specimens and autopsy reports available led to the presumption that the endophlebitic route is the regular one for the development of thrombosis and thrombophlebitis, i.e. the development of thrombosis from the wounded cone to the main veins proceeds as a continuous process. The development of this process is facilitated and speeded up by a late and incomplete primary surgical treatment of the wound, as well as an unsatisfactory immobilization of the leg during transportation. In these conditions damage to the deep veins was observed in 90% of cases, and changes in lymphatic vessels and nodes in only 15.7%. Pain along the thrombosed vein was always present. Thickening of the vein was noted in 36% of cases, but persistent oedema of the leg was present in 80%. Also, a loss or a weakening of the peripheral pulse was noted in the damaged leg. Treatment was mainly conservative. Only 4.5% of the patients were treated surgically. Phlebectomy is regarded as the best operative procedure. In an evaluation of the methods of treatment of thrombosis and thrombophlebitis of the legs, the intra-osseous administration of antibiotics and the operative removal **(S)** of the thrombosed vein are emphasized.

"APPROVED FOR RELEASE: 08/25/2000

CIA-RDP86-00513R001653130005-7

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IJP(c) RWH/AT Po-4/Pab-10/Pi-4

S/0057/65/035/001/0165/0167

ACCESSION NR: AP5003257

AUTHOR: Pashchenko, V.P. / Stakhanov, I.P. / Stepanov, A.S.

TITLE: On the influence of the plasma density near the electrode on the conductivity in a transverse magnetic field

SOURCE: Zhurnal tekhnicheskoy fiziki, v.35, no.1, 1965, 165-167

TOPIC TAGE: plasma, plasma density, plasma diffusion, thermoelectric converter

ABSTRACT: A magnetic field affects the conductivity of a plasma not only by altering the diffusion constant but also by influencing the density of the plasma in the neighborhood of the electrode. This latter effect is calculated in the present paper. The electron distribution function in the electrode region is computed separate the distribution function for intermediate fields,

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L 26970-65

ACCESSION NR: AP5003257

were compared with measurements performed with a mock thermoelectric converter by plotting the ratio of the saturation current to the equilibrium current (obtained by extrapolation from the low temperature region) against the strength of the applied transverse magnetic field. The apparatus and experimental techniques are deplied transverse magnetic field. The apparatus and experimental techniques are described elsewhere (Yu.K.Gus'kov, V.P.Pashchenko and Ye.Ye.Sibir,Izv.AN SSSR,Ser.fiz. 28,1537,1964). Moderately good agreement between theory and experiment was obtained. The differences between the theoretical and experimental values are ascribed to the

Card 2/3

L 26970-65

ACCESSION NR: AP5003257

ASSOCIATION: none

SUBMITTED: 15May64

SUB CODE: NE , EE

NR REF SOV: 006

OTHER: OOO

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001653130005-7

Card 3/3

STEPANOV, A. S.; STAKHANOV, I. P.; GUS'KOV, Yu. K.; KASIKOV, I. I.; PASHCHENKO, V. P.; MAYEV, S. A.; LEBEDEV, M. A.

"State of the investigations into physical processes in thermionic converters." report to be presented at Intl Conf on Thermionic Electrical Power Generation, London, 20-24 Sep 65.

USSR State Comn for Applications of Atomic Energy, Moscow.

Current fluctuations in a thermoelectric energy converter. There take, fiz. 35 no.1:132-139 In 155.

(ATRA 19-3)

PASHCHENKO, V.P.; STAKHANOV, I.P.; STEPANOV, A.S.

Effect of plasma density near the electrode on conductivity in a transverse magnetic field. Zhur. tekh. fiz. 35 no.1:165-167

[MIRA 18:3]

Ja 165.

KUBASOV, N.V., assistent; STEPANOV, A.T., vetvrach

Syringe combined with an illuminator. Zhivotnovodstvo 21 no.11:
77-78 N '59 (MIRA 13:3)

1. Vitebskiy veterinarnyy institut.
(Artificial insemination) (Syringes)

KAZARNOVSKIY, M. V., STEPANOV, A. V. and SHAPIRO, F. L.

"Thermalization and Diffusion of Neutrons in Heavy Media."

paper to be presented at 2nd UN Intl. Conf. on the peaceful uses of Atomic Energy, Gneva, 1 - 13 Sep 58.

Muracy, Markey, Markey	way, 1958. ***Reach Whenche on the Peaceful Uses of Atomic Engergy. ****Para ***Para	EPANOV, A.V.
Emitriev 4.B. Bo Beatters (Report Mo Elrillin, V.A., and Specific Volumes eure Range (Report	. 2084) 3. A. Ulybin. Experimental Determination of Heary Water in a Wide Temperature and Press. No. 2471)	8 %

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STEPANOV, A. V., CANB PHYS-MATH Scil, CERTAIN PROBLEMS

OF THE THEORY OF INTERACTION OF SLOW NEUTRONS WITH MATTER.

MOSCOW, 1960. (MOSCOW STATE UNIV IM M. V. LOMONOSOV. Scilles Inst of Nuclear Phys). (KL, 2-61, 199).

-20-

S/089/60/008/006/023/023/XX B006/B063

26.2241

AUTHOR:

Stepanov, A. V.

TITLE:

Convergence of Series in the Multigroup Theory of Neutron

Diffusion 19

PERIODICAL:

Atomnaya energiya, 1960, Vol. 8, No. 6, pp. 550 - 551

TEXT: The author of the present paper shows that the convergence of several series appearing in the multigroup theory (when the temperature of the neutrons produced is much higher than k0, where 0 is the moderator temperature) can be improved even without age approximation. This is illustrated by the example of the neutron flux distribution

 $N(\vec{r},x) = \psi(\vec{r},x) + \psi(\vec{r},x)$, where $\psi(\vec{r},x)$ coincides with $N(\vec{r},x)$ when $E \gg k\theta$ and $\psi(\vec{r},x)$ is represented by an expansion with respect to Laguerre poly-

nomials: $\varphi(\vec{r}, x) = xe^{-x} \sum_{i=0}^{\infty} \frac{1}{i!(i+1)!} \cdot L_{(i)}^{(1)}(x) n_i(\vec{r})$. This series converges

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Convergence of Series in the Multigroup S/089/60/008/006/023/023/XX Theory of Neutron Diffusion S/089/60/008/006/023/023/XX

much better than an expansion of $N(\vec{r}_2x)$. This is demonstrated by two special cases: i) the distribution of neutrons in a heavy moderator $(M \ge 1)$ which is a monatomic gas and has the form of a plate set containing uniformly distributed sources of monoenergetic neutrons. The neutrons are; however, inhomogeneously absorbed since part of the plates consist of a pure moderator and part of them of a homogeneous mixture.

2) The distribution function of neutrons emitted by a point source in a bounded volume of a homogeneous mixture of moderator nuclei and nuclei bounded volume of a homogeneous mixture of moderator nuclei and nuclei of superthermal resonance. The parameters of the expansion in three-of superthermal resonance. The parameters of the expansion in three-of the moderator. Results are collected in a Table. The author thanks of the moderator. Results are collected in a Table. The author thanks of the moderator of suggesting the topic, and Z. P. Mukhin for numerical calculations. There are 1 table and 4 references: 3 Soviet and 1 US.

SUBMITTED:

January 21, 1960

Card 2/2

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26.2240 24.6510

Kazarnovskiy, M. V., Stepanov, A. V.

AUTHORS:

Elastic Resonance Scattering of Slow Neutrons in Crystals

TITLE:

Zhurnal eksperimental noy i teoreticheskoy fiziki, 1960,

Vol. 39, No. 4(10), pp. 1039 - 1041 PERIODICAL:

TEXT: The present paper gives formulas for differential elastic resonance scattering cross sections of slow neutrons in crystals. The authors confined themselves to nuclei having levels of resonance energies & ev and a relatively high ratio of neutron width to total level width (≥ 0.1), such as Xe¹³⁵, Yb¹⁶⁸, Tm¹⁶⁹, Hf¹⁷⁷, Re¹⁸⁵, Au¹⁹⁷, and 240 First, a formula that is exact up to a trivial constant factor is given for the elastic resonance scattering probability of neutrons in a crystal, neglecting the total resonance level width [of the quantum state of the lattice. Using the results of Lamb (Ref. 1), a few other expressions are given, which are further treated in Debye approximation.

n-md 1/2

81,1,08

Elastic Resonance Scattering of Slow Neutrons S/056/60/039/004/026/048 in Crystals B006/B063

Thus, $P = \int_0^\infty dt \, \exp\left\{it\left(\frac{p^2}{2m} - E_o\right) - \frac{1}{2}Pt + g(t)\right\}$, and the mean square $|P|^2$ in Debye approximation has the form $|P|^2 = 2\pi a^{-2} \exp\left\{2Ref(t_o)\right\}$, $a^2 = \left|d^2g(t)/dt^2\right|_{t=t_o}$, where t_o is the value of t corresponding to the maximum of the function $f(t) = g(t) + it(p^2/2m - E_o) - \Gamma t/2$. The two special cases $T \gg \theta$ (θ - Debye temperature) and T = 0 are considered. For the two cases, the authors give expressions for g(t) and determine $f(t_o)$.

F. L. Shapiro is thanked for discussions. There are 3 references: 1 Soviet, 1 US, and 1 German.

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

SUBMITTED: May 3, 1960 (initially) and July 28, 1960 (after revision)

Card 2/2

"APPROVED FOR RELEASE: 08/25/2000

CIA-RDP86-00513R001653130005-7

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s/058/62/000/004/029/d60

26.2241

AUTHOR:

Stepanov, A. V.

TITLE:

On the theory of neutron thermalization in heavy crystalline

moderators

PERIODICAL: Referativnyy zhurnal, Fizika, no. 4, 1962, 60, abstract 4B450 (V sb. "Neytron. fizika". Moscow, Gosatomizdat, 1961, 92 - 99)

In the work of Kazarnovskiy et al. (RZhFiz, 1960, no. 10, 25988) a TEXT: method was developed for investigating the thermalization and diffusion of neutrons in heavy media. In a diffusion approximation the transport equation was reduced to a system of diffusion equations by means of expansion of the neutrondistribution function in energy groups. The requisite information concerning the dynamic properties of the moderator was contained in the coefficient $\gamma_{1k}.$ In the present work under some assumptions concerning the frequency spectrum of the natural vibrations of the crystal lattice of the moderator an expression is derived for γ_{ik} in the form of rapidly converging series (~n⁻⁴), and the dependence of γ_{ik} on the form of the frequency spectrum of the crystal's natural vibrations is investigated. O. Moskalev

[Abstracter's note: Complete translation]

Čard 1/1

"APPROVED FOR RELEASE: 08/25/2000

CIA-RDP86-00513R001653130005-7

s/638/61/001/000/014/056 B101/B102

AUTHORS:

Kazarnovskiy, M. V., Stepanov, A. V.

TITLE:

Neutron thermalization. (A review paper)

Tashkentskaya konferentsiya po mirnomy ispol'zovaniyu

SOURCE:

atomnoy energii. Tashkent, 1959. Trudy. v. 1. Tashkent, 1961.

TEXT: This is a report on the development of research into the interaction of neutrons with matter since 1936 (Fermi). Such subjects as interactions between neutrons and atoms, molecules, crystals and liquids are briefly dealt with as well as the multiple scattering of neutrons in matter taking account of the chemical bond and of the atomic thermal motion; and also an approximate representation of neutron thermalization in a heavy gas. Experiments conducted at FIAN are mentioned. S. I. Drozdov, D. F. Zaretskiy, and F. L. Shapiro (Reports at the Second Geneva Conference on the Peaceful Uses of Atomic Energy) are referred to. There are 2 figures and 47 references: 6 Soviet and 41 non-Soviet. The four most recent

card 1/2

Neutron thermalization. (A review paper) $\frac{S/638/61/001/000/014/056}{B101/B102}$

references to English-language publications read as follows: Brockhouse B. N., Phys. Rev. Lett., 2, 256, 1959; Palevsky H., Hughes D. J., Kley W., Tunkelo E., Phys. Rev. Lett., 2, 258, 1959; Chose A., Palevsky H., Hughes D. J., Pelah I., Eisenhauer C. M., Phys. Rev., 113, 49, 1959; Brockhouse, B. N., Phys. Rev. Lett., 2, 287, 1959.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR (Physics Institute imeni P. N. Lebedev of the AS USSR)

Card 2/2

S/056/61/040/002/029/047 B112/B214

AUTHORS:

Podgoretskiy, M. I., Stepanov, A. V.

TITLE:

The problem of Doppler width of emission and absorption

lines

PERIODICAL:

Zhurnal eksperimentalinov i teoreticheskov fiziki, v. 40,

no. 2, 1961, 561-566

TEXT: Classical and quantum-mechanical methods are used to study the consequence of the Doppler effect on the width of emission and absorption lines of gases and highly ideal liquids (very dense gases). The amplitude of the emitted radiation is $A \sim \exp\left[i\omega_0 t - \lambda t/2 + i\kappa x(t)\right]$, where ω_0 is the frequency, $1/\lambda$ the mean lifetime, and κ the wave number. The dependence of the spectral intensity I on $\Omega = \omega_0 = \omega$ is given by the

formula: $I(\Omega) = \text{Re} \int_{\Omega}^{\infty} d\tau \exp \left\{-i\Omega\tau - 1/2\lambda\tau - 1/4\chi^2\sigma^2(\tau)\right\}$.

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The problem of Doppler width...

S/056/61/040/002/029/047 B112/B214

The function $\sigma^2(\tau)$ is characteristic of the motion causing the Doppler effect. Several expressions are given in the paper for this function, including one due to S. Chandrasekar, which holds for an absorbing system diffusing in a compressed gas or a liquid:

 $\sigma^2(\tau) = 4D\left[\tau - (1 - e^{-\tau/\tau})/\eta\right], \eta = \frac{kT}{MD}$. Here, D is the diffusion co-

efficient, k the Boltzmann constant, T the temperature, and M the mass of the absorbing atom. If the condition

 $kT/MD^2\kappa^2 \approx (\Lambda/2\pi L)^2 \gg 1$ is satisfied (Λ is the wavelength, L the mean free path), the following relation holds:

 $I(\Omega) \sim \left[\Omega^2 + (\lambda/2 + \chi^2 D)^2\right]^{-1}$. In this case there is a narrowing of the line width of the order of $\chi^2 D$ as against the usual Doppler width $\chi(kT/M)$ for small L/Λ ; a broadening of the line width results for large L/Λ . The paper is concluded by a discussion of the possibility of the experimental observation of the resonance absorption of gamma quanta and slow neutrons in liquids. F. L. Shapiro is thanked for discussions,

Card 2/3

The problem of Doppler width...

S/056/61/040/002/029/047 B112/B214

and M. V. Kazarnovskiy and I. I. Sobel man for help. There are 12 references: 3 Soviet-bloc and 7 non-Soviet-bloc.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy

(Joint Institute of Nuclear Research).

Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR

(Institute of Physics imeni P. N. Lebedev, Academy of

Sciences USSR)

SUBMITTED:

August 3, 1960

Card 3/3

CIA-RDP86-00513R001653130005-7" APPROVED FOR RELEASE: 08/25/2000

KAZARNOVSKIY, M.V.; STEPANOV, A.V.

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Theory of resonance scattering on atomic systems. Acta phys Hung 14 no.1:45-66 62.

1. Fizicheskiy Institut im. P.N. Lebedeva AN SSSR, Moskva, SSSR. Predstavleno Albert Konya.

KAZARNOVSKIY, M.V.; STEPANOV, A.V.

From the Francisco of the State of the State

"Observed" probabilities of elastic neutron scattering and the Mossbauer effect in degenerated systems, and some new possibilities for producing such systems. Zhur.eksp.i teor.fiz. 43 no.6: 2299-2301 D *62.

1. Fizicheskiy institut imemi Lebedeva AN SSSR.
(Neutrons--Scattering) (Mossbauer effect) (Quantum theory)

S/056/62/042/002/029/055 B108/B104

AUTHORS:

26.2252 HORS: Kazarnovskiy, M. V., Stepanov, A. V.

TITLE:

Theory of resonance scattering from atomic systems. I.

General formulas

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42,

no. 2, 1962, 489 - 498

The authors derived general formulas for the probabilities of resonance and interference scattering. Under the assumption that an excitation (gamma absorption or neutron capture) does not affect the motion of the center of gravity of the scattering atoms, and that energy and width of the excited level are independent of atomic number and spin projection of the excited nuclei, the total probability of resonance scattering is

 $W(\mathbf{p}_{i}, \mathbf{p}_{j}) = 2\pi A \sum_{\mathbf{r}} \omega_{\mathbf{r}\mathbf{r}}(\mathbf{p}_{i}, \mathbf{p}_{j}) + 2\pi B \sum_{\mathbf{r}} \omega_{\mathbf{r}\mathbf{r}'}(\mathbf{p}_{i}, \mathbf{p}_{j}),$ $\omega_{\mathbf{r}\mathbf{r}'}(\mathbf{p}_{i}, \mathbf{p}_{j}) = \sum_{m_{i}} \sum_{m_{j}} \sum_{m_{k}} \sum_{m_{k}} (E_{i} - E_{o} - E_{m_{k}} + \frac{1}{4} i \Gamma)^{-1} \times$ (1)

dard 1/4

s/056/62/042/002/029/05 B108/B104 Theory of resonance scattering... $\times (E_I - E_0 - E_{m_\lambda'} - \frac{1}{2}i\Gamma)^{-1} \langle m_I | \exp(-ip_I R_v) | m_\lambda \rangle \langle m_\lambda | \exp(ip_I R_v) | m_I \rangle \times \\ \times \langle m_1 | \exp(-in_1 R_v) | m_1 \rangle^* \langle m_1' | \exp(ip_1 R_v) | m_1 \rangle^* \delta(E_I - E_I),$ (2) $\times \langle m_i | \exp{(-ip_i R_{\star})} | m_{\lambda}^* \rangle^* \langle m_{\lambda}^* | \exp{(ip_i R_{\star})} | m_i \rangle^* \delta(E_i - E_i),$ is the probability that the scattering system initially was in where gmi the state m_i. Moreover, $\omega_{n}(\mathbf{p}_{l},\mathbf{p}_{l}) = (2\pi)^{-1} \int_{0}^{\infty} d\mathbf{r} \int_{0}^{\infty} dt' Z_{n'}(\mathbf{p}_{l},\mathbf{p}_{l},\mu_{l},l') \times \tag{8}$ $\times \exp{(i\mu (E_{\rho_l} - E_{\rho_l}) + it (E_{\rho_l} - E_0 + \frac{1}{4}i\Gamma)} - it' (E_{\rho_l} - E_0 - \frac{1}{4}i\Gamma)\},$ $Z_{w'}(\mathbf{p}_{i}, \mathbf{p}_{j}, \mu_{j'}, i') = \{\operatorname{Sp} e^{-H/T}\}^{-1} \operatorname{Sp} [e^{-H/T} \hat{Z}_{w}];$ with (10) (11) $\hat{Z}_{w'} = \exp\left\{-ip_{l}\hat{\mathbf{R}}_{s'}(\mathbf{p}+l-l')\right\} \exp\left\{ip_{l}\hat{\mathbf{R}}_{s'}(\boldsymbol{\mu}+l)\right\} \times$ $\times \exp\{(-i\mathbf{p}_i\hat{\mathbf{R}}_*(t))\}\exp\{i\mathbf{p}_i\hat{\mathbf{R}}_*(0)\}.$ Card 2/4

S/056/62/042/002/029/05 B108/B104

Theory of resonance scattering...

The physical meaning of the correlation function $Z_{\gamma\gamma}$ can be seen from

$$\Gamma_{w'}(\mathbf{R}_{i}, \mathbf{R}_{i}, \mu_{i}, t, t') = (2\pi)^{-6} \int d\mathbf{p}_{i} d\mathbf{p}_{j} Z_{w'}(\mathbf{p}_{i}, \mathbf{p}_{j}, \mu_{i}, t, t') e^{i\mathbf{R}_{i}\mathbf{p}_{j} - i\mathbf{R}_{i}\mathbf{p}_{i}}, \qquad (12)$$

$$Z_{w'}(\mathbf{p}_{i}, \mathbf{p}_{j}, \mu_{i}, t, t') = \int d\mathbf{R}_{i} d\mathbf{R}_{i} \Gamma_{w'}(\mathbf{R}_{i}, \mathbf{R}_{i}, \mu_{i}, t, t') e^{i\mathbf{R}_{i}\mathbf{p}_{j} - i\mathbf{R}_{i}\mathbf{p}_{i}}, \qquad (13)$$

which equations show that Γ_{yy} , determines the spatial correlation of the v-th and the v'-th particle at four different instants of time. Interference of resonance and potential scattering can be taken into account by adding to the resonance scattering probability a term of the form

$$W_{int}(\mathbf{p}_{l}, \mathbf{p}_{j}) = 4\pi \operatorname{Re}\left\{A' \sum_{\mathbf{v}} v_{vv}(\mathbf{p}_{l}, \mathbf{p}_{j}) + B' \sum_{\mathbf{v} \neq \mathbf{v}} v_{vv'}(\mathbf{p}_{l}, \mathbf{p}_{j})\right\}, \quad (23)$$

with
$$v_{vv'}(\mathbf{p}_{l}, \mathbf{p}_{l}) = -i (2\pi)^{-1} \int_{-\infty}^{\infty} d\mu \int_{0}^{\infty} dt Z_{vv'}(\mathbf{p}_{l}, \mathbf{p}_{l}, \mu, t, 0) \times \\ \times \exp \{i\mu (E_{p_{l}} - E_{p_{l}}) + it (E_{p_{l}} - E_{0} + \frac{1}{2} i\Gamma)\},$$
 (24)

card 3/4

Theory of resonance scattering ...

S/056/62/042/002/029/055 B108/B104

In a subsequent paper the results of this work are to be applied to some si ale models of the motion of the scatterer atoms. Mention is made of A. Akligenor, I. Pomeranchuk (J. Phys. USSR, 11, 167, 1947), I. P. Dzyub, A. F. Lubchanko (FTT, 3, 2275, 1961; Izv. AN SSSR, seriya fiz., 25, 901, 1961). There are 22 references: 7 Soviet and 15 non-Soviet. The four most recent references to English-language publications read as follows: P. Schofield. Phys. Rev. Lett., 4, 239, 1960; K. S. Singwi, A. Sjölander. Phys. Rev., 120, 1093, 1960; G. Baym. Phys. Rev., 121, 741, 1961; M. V. Kazarnovskiy, A. V. Stepanov. Inelastic scattering of neutrons in solids and liquids, Intern. Atomic Energy Agency, Vienna, 1961, p. 87.

ASSOCIATION:

Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute imeni P. N. Lebedev of the Academy of

Sciences USSR)

SUBMITTED:

July 31, 1961

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8/2504/64/024/000/0212/0261

ACCESSION NR: AT4041827

AUTHOR: Stepanov, A. V.

TITLE: Some problems in the theory of thermal neutron interactions with matter.

SOURCE: AN SSSR. Fizicheskiy institut. Trudy*, v. 24, 1964. Issledovaniya po neytronnoy fizike (Research in neutron physics), 212-261

TOPIC TAGS: neutron, thermal neutron, neutron bombardment, neutron matter interaction, neutron distribution function, neutron transport process, atomic motion, chemical bond, phonon process, neutron scattering, neutron capture

ABSTRACT: Since the early days of neutron physics, two basic problems have become prominent: the investigation of the elementary interaction of neutrons with matter and the study of the transport processes of neutrons. A short discussion is presented on the processes involved in neutron scattering on atoms in crystalline solids and liquids including the temperature effect, phonon production, etc. The major part of this work, however, is concerned with the transport properties of neutrons. The following topics are investigated: a) the asymptotic behavior of the energy function and spatial-energy distribution of neutrons in a heavy crystalline moderator for neutrons with energy $E \gg k_BT$ and $E \gg \theta Bk$ (where θ is the Debye temperature); b) an analytical approach to

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the problem of neutron thermalization; and c) the resonance interaction of thermal neutrons with matter, which is related to the theory of thermalization, taking into account chemical bonds and the thermal motion of the absorbing atoms. The neutron distribution function in a moderator is obtained by solution of the integral differential equation with a kernel W(V,V') where W is the probability that neutrons with the velocity V' will scatter in the velocity interval V', V' + dV'. The basic equation of neutron transport for the case of a heterogeneous moderator is derived as

$$- v v N(r, v) - N(r, v) \left[\frac{1}{T(v)} + \int W(v, v') dv' \right] +$$

$$+ \int N(r, v') W(v', v) dv' + q(r, v) = 0.$$
(1)

$$\frac{v^{\varepsilon}}{3} \nabla \left\{ \left[\frac{1}{T(o)} + \int_{0}^{\infty} \omega(v, v') dv' \right]^{-1} \nabla N_{o}(\mathbf{r}, v) \right\} - N_{o}(\mathbf{r}, v) \frac{1}{T(o)} + \left[\int_{0}^{\infty} N_{o}(\mathbf{r}, v') \omega(v', v) dv' - N_{o}(\mathbf{r}, v) \int_{0}^{\infty} \omega(v, v') dv' + Q(\mathbf{r}, v) = 0, \right]$$

$$(2)$$

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ACCESSION NR: AT4041827

The spatial energy distribution function for a moderator of a heavy monoatomic gas is

given by

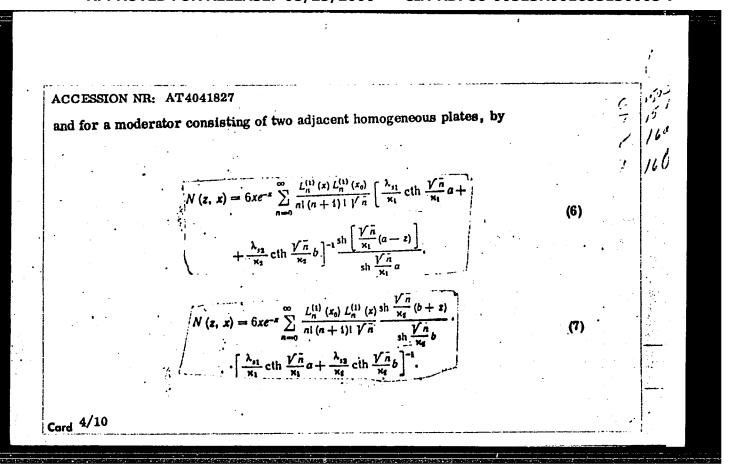
$$\frac{1}{3} \nabla \left(\lambda_{s} \nabla N \left(\mathbf{r}, \mathbf{x} \right) \right) + \frac{2}{\mu \lambda_{s}} \left[\mathbf{x} \frac{\partial^{s} N \left(\mathbf{r}, \mathbf{x} \right)}{\partial \mathbf{x}^{2}} + \mathbf{x} \frac{\partial N \left(\mathbf{r}, \mathbf{x} \right)}{\partial \mathbf{x}^{s}} + N(\mathbf{r}, \mathbf{x}) \right] + \frac{Q \left(\mathbf{r}, \mathbf{y} \mathbf{\bar{x}} \right)}{\sqrt{\mathbf{x}}} = 0.$$
(3)

and it is shown that it can be reduced to the age equation by Laplace transformation. It is also shown that this function can be obtained in the form of a collection of neutron groups. If a moderator is a homogeneous, spatially finite body, the distribution function is given by

 $N(\mathbf{r}, \mathbf{x}) = \mu \lambda_0 \sum_{i} Z_i(\mathbf{r}) Z_i(\mathbf{r}_0) \frac{\Gamma(\beta B_i)}{x_0^{AII_i}} x e^{-\mathbf{x} \mathbf{D}} (\beta B_i, 2, \mathbf{x}),$ (4)

For monoenergetic neutrons in an infinite moderator, the function is given by

$$N(r,x) = \frac{\theta}{\lambda_s} \frac{xe^{-x}}{4\pi r} \sum_{n=0}^{\infty} \frac{L_n^{(1)}(x) L_n^{(1)}(x_0)}{n! (n+1)!} \exp\left(-\sqrt{\frac{6n}{\mu \lambda_s^2}}r\right). \tag{5}$$



ACCESSION NR: AT4041827

$$\left\{ \operatorname{ch} \frac{\sqrt{n}}{N_{1}} z + \frac{\lambda_{12}N_{1}}{\lambda_{11}N_{2}} \operatorname{cth} \frac{\sqrt{n}}{N_{2}} b \cdot \operatorname{sh} \frac{\sqrt{n}}{N_{2}} z - \frac{\operatorname{sh} \frac{\sqrt{n}}{N_{1}} a}{\operatorname{sh} \frac{\sqrt{n}}{N_{1}}} a + \frac{\lambda_{12}}{N_{2}} \operatorname{cth} \frac{\sqrt{n}}{N_{2}} b \right] \operatorname{sh} \frac{\sqrt{n}}{N_{1}} (z - z_{0}) \frac{\operatorname{sh} \frac{\sqrt{n}}{N_{1}} a}{\operatorname{sh} \frac{\sqrt{n}}{N_{1}} (a - z_{0})},$$

$$N(z, x) = 6xe^{-x} \sum_{n=0}^{\infty} \frac{L_{n}^{(1)}(x_{0})L_{n}^{(1)}(x)}{\operatorname{sh}(n+1)! \sqrt{n}} \left[\frac{\lambda_{11}}{N_{1}} \operatorname{cth} \frac{\sqrt{n}}{N_{1}} a + \frac{\lambda_{12}}{N_{2}} \operatorname{cth} \frac{\sqrt{n}}{N_{2}} b \right]^{-1},$$

$$\left\{ \operatorname{ch} \frac{\sqrt{n}}{N_{1}} z + \frac{\lambda_{12}N_{1}}{\lambda_{12}N_{2}} \operatorname{cth} \frac{\sqrt{n}}{N_{3}} b \operatorname{sh} \frac{\sqrt{n}}{N_{1}} z \right\} \frac{\operatorname{sh} \frac{\sqrt{n}}{N_{1}} (a - z_{0})}{\operatorname{sh} \frac{\sqrt{n}}{N_{1}} a},$$
(9)

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For a heavy crystalline moderator and small values of V-V', the distribution function is given by $v^{\tau} \nabla_{\cdot}^{(r)} = \int_{-\infty}^{\infty} c(r, r') dr' \int_{-\infty}^{1} d$

$$\frac{v^{z}}{3} \nabla \left\{ \left[\frac{1}{T_{v}} + \int_{0}^{\infty} \omega \left(v, v^{z} \right) dv^{z} \right]^{-1} \nabla N_{o}(\mathbf{r}, v) \right\} - \frac{N_{o}(\mathbf{r}, v)}{T(v)} + \left(+ N_{o}(\mathbf{r}, v) I_{o}(v) + \frac{v}{1!} \frac{\partial N_{o}(\mathbf{r}, v)}{\partial v} I_{1}(v) + \frac{v^{2}}{2!} \frac{\partial^{2} N_{o}(\mathbf{r}, v)}{\partial v^{2}} I_{o}(v) + \left(+ \frac{v^{2}}{2!} \frac{\partial^{2} N_{o}(\mathbf{r}, v)}{\partial v^{2}} I_{o}(v) + \cdots + Q(\mathbf{r}, v) = 0, \right]$$

$$(10)$$

for $V << V_o$ it is given by

$$N_{0}(v) = \frac{\mu\lambda_{s}}{v^{2}}e^{-A/v}\left[1 + \frac{2\tau}{v^{2}} + \frac{6\tau^{3}}{v^{4}} - \frac{5}{8}\frac{\overline{\Omega}^{i}}{v^{4}} - \frac{7}{6}\frac{\tau}{v^{2}}\frac{A}{v} + \frac{1}{8}\frac{\tau}{v^{2}}\frac{A^{3}}{v^{2}}\right], \tag{11}$$

and the estimate of the influence of the chemical bond and the thermal motion of the atom is based on

$$N_{0}(v) = \frac{\mu\lambda_{s}}{\sigma^{3}}e^{-A/\sigma}\left[1 + \frac{2\tau}{v^{3}} + \frac{6\tau^{3}}{v^{4}} - \frac{5}{8}\frac{\Omega^{3}}{\sigma^{4}} - \frac{7}{6}\frac{\tau}{\sigma^{4}}\frac{A}{\sigma^{4}} + \frac{1}{8}\frac{\tau}{\sigma^{4}}\frac{A^{3}}{\sigma^{4}}\right],$$
(12)

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The thermalization and diffusion of neutrons is analyzed by the expansion of the distribution function in energy groups. The neutron balance relations are given by $\frac{1}{\sqrt{x}}\frac{\partial N\left(\mathbf{r},x,t\right)}{\partial t}+\frac{1}{3}\nabla\left\{\lambda\nabla N\left(\mathbf{r},x,t\right)\right\}-\frac{1}{\sqrt{x}T\left(x\right)}N\left(\mathbf{r},x,t\right)-\frac{1}{\sqrt{x}T\left(x\right)}N\left(\mathbf{r},x,t\right)$ (13)

$$\frac{1}{\sqrt{x}} \frac{\partial N(\mathbf{r}, \mathbf{x}, t)}{\partial t} + \frac{1}{3} \nabla \{\lambda \nabla N(\mathbf{r}, \mathbf{x}, t)\} - \frac{1}{\sqrt{x}T(\mathbf{x})} N(\mathbf{r}, \mathbf{x}, t) - \frac{1}{\sqrt{x}T(\mathbf{r}, t)} N(\mathbf{r}, t) - \frac{$$

Derivation of the distribution function for the case of a pulsed neutron source in finite a neutron is based on

$$\sum_{l=0}^{\infty} \left\{ -\left(\frac{1}{\sqrt{x}}\right)_{lk} \frac{\partial n_l(\mathbf{r}, t)}{\partial t} + \frac{1}{3} \nabla \left\{ (\lambda)_{lk} \nabla n_l(\mathbf{r}, t) \right\} - n_l(\mathbf{r}, t) \cdot \left(\frac{1}{\sqrt{x} T(x)}\right)_{lk} - \gamma_{lk} n_l(\mathbf{r}, t) \right\} + P_k(\mathbf{r}, t) = 0, \quad k = 0, 1, 2...$$
(15)

Card 7/10

The spatial-energy distribution function in a heterogeneous moderating medium is given in the frame of the two-group approximation by

ame of the two-group approximates
$$a = \frac{1}{n_0^1}(z) = \left(\frac{1}{k_1 - k_2}\right)^1 \left\{k_1 \left[e^{-\alpha_1 z} \left(C_2 + \frac{q_2}{2x_2^2}\right) - \frac{q_2}{\alpha_2^2}\right] - k_2 \left[e^{-\alpha_1 z} \left(C_1 + \frac{q_1}{2\alpha_1^2}\right) - \frac{q_1}{\alpha_2^2}\right]^1,$$

$$n_1^1(z) = \left(\frac{1}{k_1 - k_2}\right)^1 \left\{e^{-\alpha_1 z} \left(C_1 + \frac{q_1}{2x_2^2}\right) - e^{-\alpha_1 z} \left(C_2 + \frac{q_2}{2x_2^2}\right) - \frac{q_1}{\alpha_2^2} - \frac{q_2}{\alpha_2^2}\right\}^1,$$

$$z > a;$$

$$n_0^{11}(z) = \left(\frac{1}{l_1 - l_2}\right)^{11} \left\{l_1 \left[D_2 \cosh \beta_2 z + \frac{\psi_2}{\beta_2^2} \left(\cosh \beta_2 z - 1\right)\right] - l_2 \left[D_1 \cosh \beta_1 z + \frac{\psi_1}{\beta_1^2} \left(\cosh \beta_1 z - 1\right)\right]\right\}^{11},$$

$$n_1^{11}(z) = \left(\frac{1}{l_1 - l_2}\right)^{11} \left\{D_1 \cosh \beta_1 z + \frac{\psi_1}{\beta_1^2} \left(\cosh \beta_1 z - 1\right) - D_2 \cosh \beta_2 z - \frac{\psi_2}{\beta_2^2} \left(\cosh \beta_2 z - 1\right)\right\}^{11},$$

$$a > z > 0.$$

The influence of the dynamic properties of the atoms of the moderating medium on the therr alization of neutrons is also investigated by studying the relation between the parameters of thermalization and the correlation function in the moderating material.

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In the investigation of the resonance interaction of thermal neutrons and \checkmark quanta with matter, the probability of resonance absorption is derived and given by

$$W(E) = \frac{2}{\hbar\Gamma} |M_e|^2 \operatorname{Re} \int_0^\infty dt \, e^{\frac{tt}{\hbar} \left(E_e - E + t\Gamma / L\right)} e^{-\frac{\hbar^2}{4} \Delta^*(t)}. \tag{18}$$

In the case of a liquid moderator this probability is given by

quid moderator this probability is
$$G_s(\mathbf{r},t) = N^{-1} \left\langle \sum_{j=1}^{N} \int d\mathbf{r}' \delta(\mathbf{r} + \hat{\mathbf{R}}_j(0) - \mathbf{r}') \delta(\mathbf{r}' - \hat{\mathbf{R}}_j(t)) \right\rangle$$
 (19)

"The author is indebted to M.V. Kazarnovskiy for his constant interest, valuable comments and advice, to F. L. Shapiro for stimulating discussions and to Z. P. Mukhin for carrying out a significant proportion of the numerical calculations. Orig. art. has: 1 table, 4 figures and 121 numbered formulas.

ASSOCIATION: Fizicheskiy institut im. P.N. Lebedeva AN SSSR (Physics Institute, AN SSSR)

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ACCESSION NR: AP4042382

AUTHORS: Kazarnovskiy, M. V.; Stepanov, A. V.

TITLE: Elastic scattering of neutrons and the Mossbauer effect in

systems with local degrees of freedom

SOURCE: Zh. eksper. i teor. fiz., v. 47, no. 1, 1964, 139-146

TOPIC TAGS: neutron scattering, energy level, Mossbauer effect, temperature dependence, correlation statistics, krypton

ABSTRACT: It is shown that additional valuable information on the energy levels corresponding to the local degrees of freedom, and particularly their lifetime, can be obtained from an analysis of elastic (more precisely, quasielastic) scattering of neutrons. The possibilities are discussed of investigating these lifetimes and the laws of motion relative to local degrees of freedom by quasielastic incoherent scattering of slow neutrons and also by the Mossbauer

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ACCESSION NR: AP4042382

effect. It is shown, in particular, that under conditions of "poor resolution" the dependence of the probabilities for these effects on momentum transfer and on the temperature of the medium differs essentially from that of a system without local state. It is demonstrated that the cross section for quasielastic scattering of neutrons should depend significantly on whether local degrees of freedom are or are not present. The magnitude of the effect, as expressed by the ratio of the correlation functions, amounts to 0.2 as determined by neutron scattering and 0.5 as determined by the Mossbauer effect. It is pointed out that at large momenta, the probability may even increase with temperature. This effect may explain the peculiar temperature dependence of the Mossbauer effect on krypton embedded in organic compounds (Hazoni et al., Physics Letters, 2, 337, 1962). The practical difficulties of observing the peculiarities in the temperature behavior of the correlation function when local degrees of freedom are present are discussed. authors are deeply grateful to F. L. Shapiro for continued interest

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and to M. A. Krivoglaz Orig. art. has: 3 figur	and A. A. Ma es and 18 fo	aradudin i	for helpful	. discussi	ions."	
ASSOCIATION: Fizichesk SSSR (Physics Institute	iy institut , Academy o	im. P. N. f Sciences	Lebedeva SSSR)	Akademii	nauk	
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s/0056/64/047/002/0543/0557

ACCESSION NR: AP4043629

AUTHORS: Kazarnovskiy, M. V.; Stepanov, A. V.

TITLE: The time correlation function method and its application to the theory of Mossbauer line shift and deformation

Zh. eksper. i teor. fiz., v. 47, no. 2, 1964, 543-557

TOPIC TAGS: Mossbauer effect, excited state, correlation technique, radiation effect theory, time correlation, line shift

ABSTRACT: The interaction between radiations of arbitrary type (particles, quanta) with complex systems (molecules, liquids) is analyzed in order to ascertain what information concerning the structure and dynamics of the complex system can be obtained from an analysis of the data obtained by sounding the system with radiation and, conversely, what characteristic of the complex system must be known in order to predict the results of such an action. Starting

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with the van Hove expression for the differential scattering cross section

 $\frac{\partial^2 \sigma}{\partial E \partial \Omega} \sim \int_{-\infty}^{\infty} \exp\left(-\frac{i}{\hbar} t \Delta E\right) K(t) dt,$

where K(t) is the statistical and quantum mechanical mean of an operator $T^+(t)T(0)$ and ΔE -- energy transfer, it is shown here that (1.1) is a general formula and different types of sounding particles and their interaction with the system differ only in the concrete form of the operator T(t). Each such operator is regarded as a dynamic variable characterizing the investigated system. The corresponding function K(t) is the time correlation function of this dynamic variable. The types of the operator T(t) for different particular cases are considered. By way of an example, the shift and deformation of a Mossbauer line due to the difference in the Hamiltonians of the atomic motion, when the Mossbauer nucleus is in the ground state and in the excited state. Integral relations connecting the

Card 2/3

J.C.K

Mossbauer probability (as a function of the temperature) with the shape of the Mossbauer line are obtained. It is shown that when there are discrete degrees of freedom, the Mossbauer line will not only shift but will also be greatly distorted. Some possible applications of the time correlation function technique are discussed. Orig. art. has: 49 formulas.

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

SUBMITTED: 10Jan64 ENCL: 00

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Cord 3/3

GS/GW EWT(1)/EWT(m)/FCC/EWA(h) L 27510-66 UR/0000/65/000/000/0357/0360 ACC NR: AT5023950 AUTHOR: Gedeonov, L.I.; Zhilkina, M.I.; Il'inskaya, T.A.; Stepanov, A.V. ORG: None TITLE: Chemical composition of atmospheric precipitation and fallouts in the vicinity of Leningrad SOURCE: Nauchnaya konferentsiya po yadernoy meteorologii. Obninsk, 1964. Radioactivnyye izotopy v atmosfere i ikh ispol'zovaniye v meteorologii (Radioactive isotopes in the atmosphere and their use in meteorology); doklady konferentsii. Moscow, Atomizdat 1965, 357-360 TOPIC TAGS: fallout chemical composition; Leningrad viccinity fallout, fallout determination methods radioactive fallout, almospheric precipitation, radioactive fallout, atmospheric precipitation ABSTRACT: The aim of this study was the determination of radioactive fallout composi tion with higher than usual precision and range. Samples were analysed to determine two groups of data: a) radioactive fission products content, b) content of macroadmixtures. Radioactive fission products were caught into aluminum containers with 1 squ. meter area, 10 cm. deep, provided with a layer of oiled filter paper on the bottom, and into porcelain tanks filled with a weak solution of nitric acid in water. After a monthly exposure on an open platform, the accumulated material was evaporated, burned fired and weighed. After a measurement of total beta activity and the spectrum of

ACC NR: AT502395	TABLE	1	
Compe	osition of fallout by indiv of Leningrad. Period of	ridual elements, in the vis collection: 1960-1963.	cinity
	Element:	Concentration, %:	
	As, Bi, Cd, Ge, Hg, In, Nb, Sb, Ta, Tl, W, Th, Sc, U	Not detected by the spectral analysis method	
	Ag, Be, Mo, Co, Ga, Cs	<0,001	
	Sn, Y	0,0010,01	
	Cu, Cr, Mn, Ni, Pb, Sr. Zn, Zr, La, Ce, V	0,01-0,1	
	Ti, Ba	0,1—1,0	
	Ca, Si, Fe, Al, Mg, P, Na, K	1,0-10 and over.	

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nination of the content	the 115510	Aglil Mo ⁹⁹	Zn ⁹⁵ . Sb ¹²⁵	Be ⁷ and	other isc	topes was	also deter
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iatorminati	ione Table	1 shows the	results of nity of Leni	analysis of	50 Sampi	les gathere	G garran
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SOURCE CODE: UR/0089/66/020/003/0265/0266

AUTHOR: Stepanov, A. V.

ORG: none

TITLE: Contribution to the theory of neutron transport in media with random inhomogeneities

SOURCE: Atomnaya energiya, v. 20, no. 3, 1966, 265-266

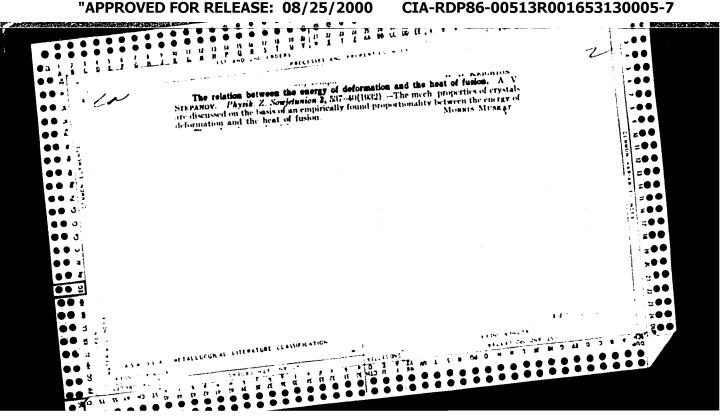
TOPIC TAGS: reactor neutron flux, transport phenomenon, kinetic equation, reactor moderator, thermal neutron

ARSTRACT: This is an abstract of paper no. 60/3372 submitted to the editor and filed, but not published in full. The kinetic equation is written out for the neutron density in an inhomogeneous moderator whose scattering properties are random functions of x (x is the total aggregate of independent variables of the problem). The authors determine the average neutron density, for which they derived an approximate equation by quantum theory. This equation is solved for stationary diffusion of thermal neutrons from a flat source placed in an infinite moderator with random but weak absorption. The solution displays the transient and the asymptotic terms and an expression for the relaxation length of the asymptotic solution is given. The expressions are valid for both strong and small-scale fluctuations. If the thermal neutrons diffuse from a non-stationary flat source placed in an inhomogeneous layer of the moderating substance, the main spatial harmonic of the neutron flux decreases with time in a nonexponential fashion. Orig. art. has: 3 formulas.

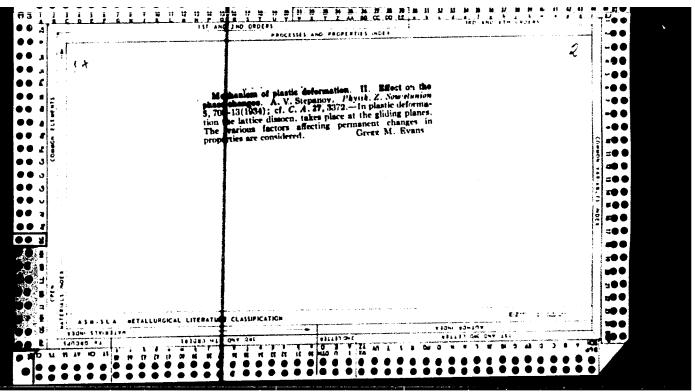
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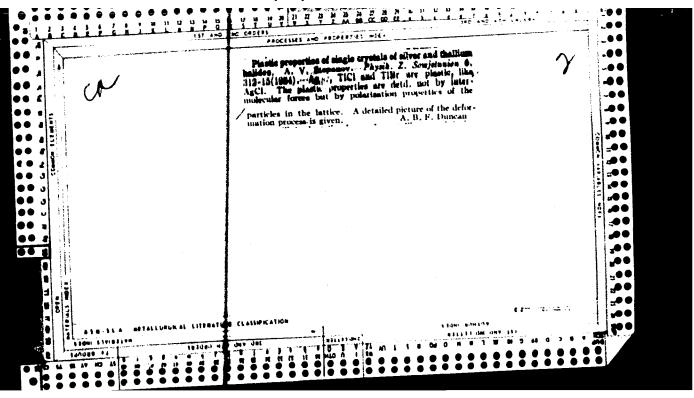
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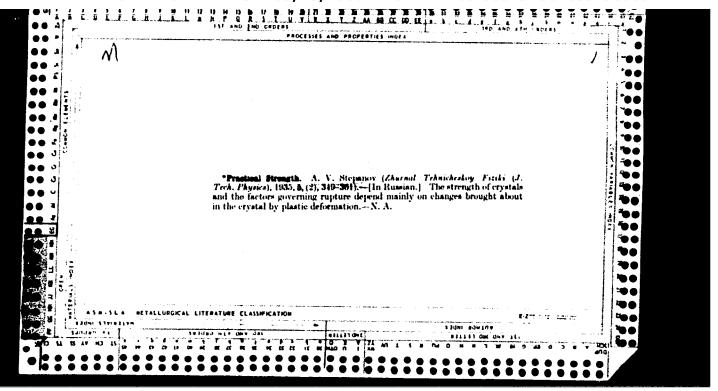
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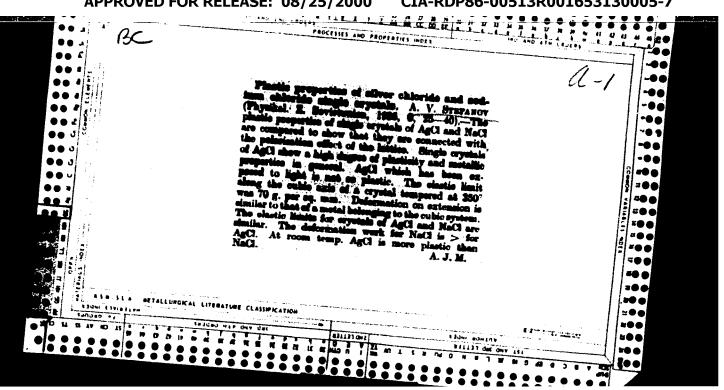


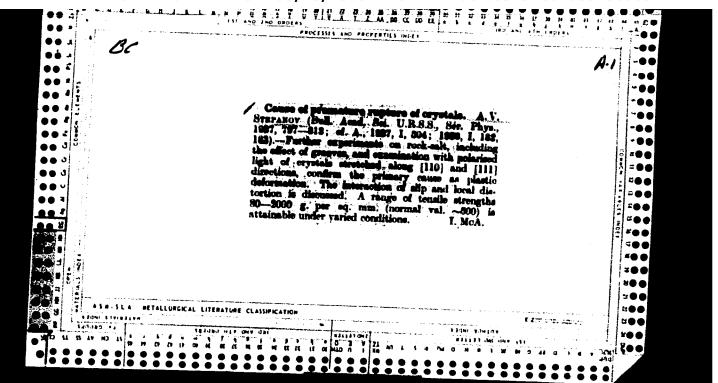
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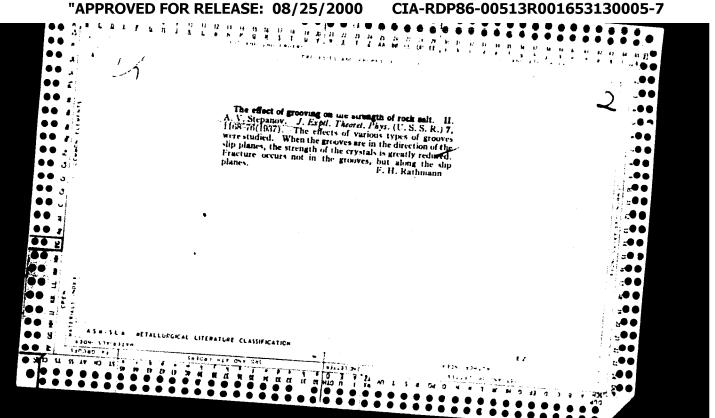


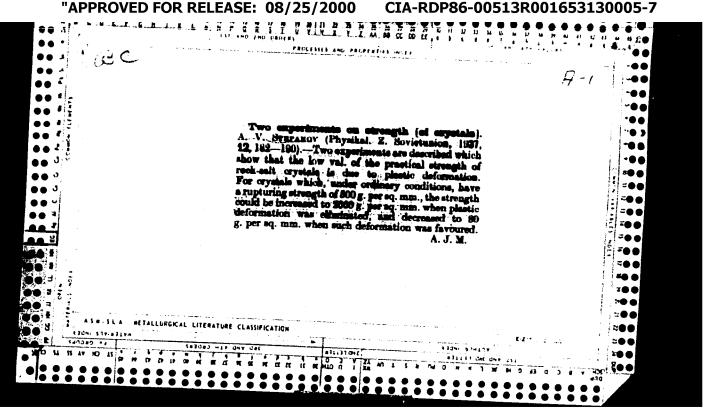


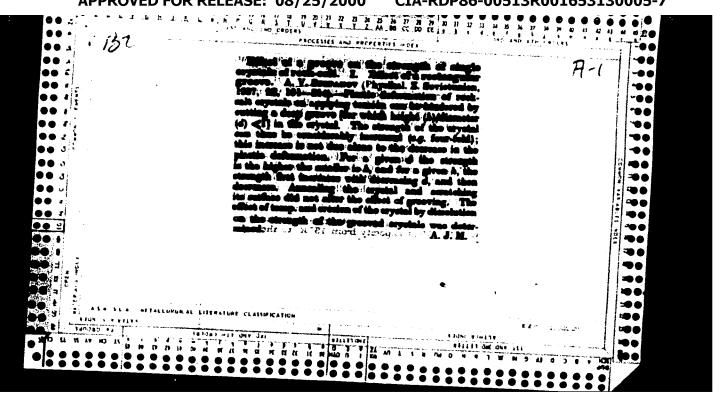


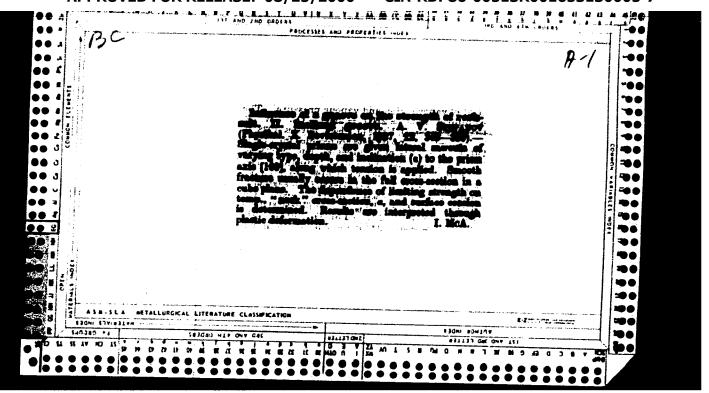




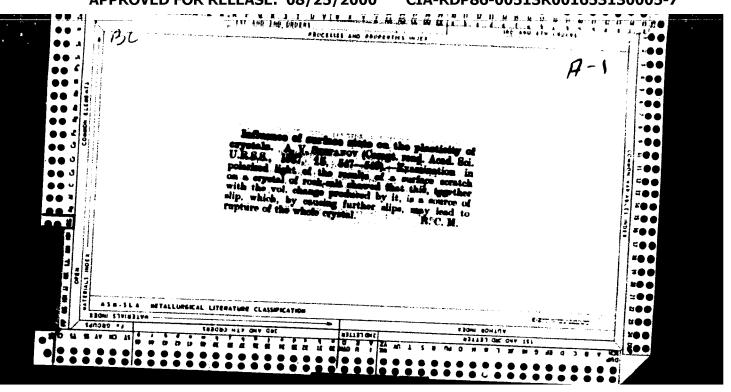


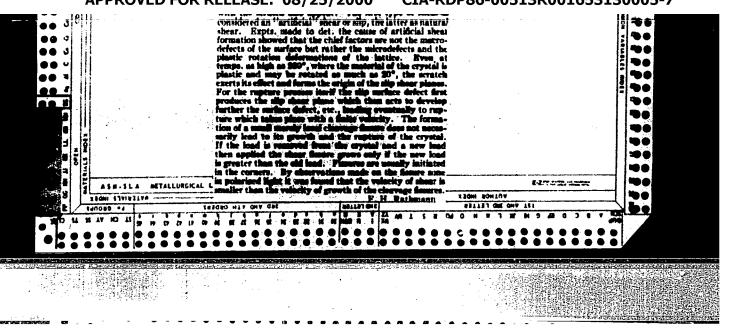


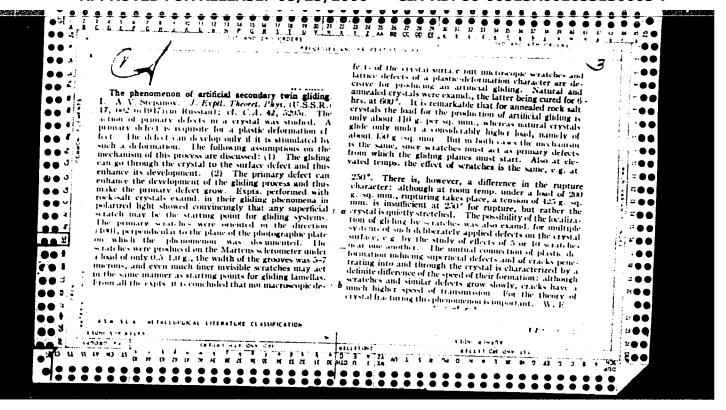


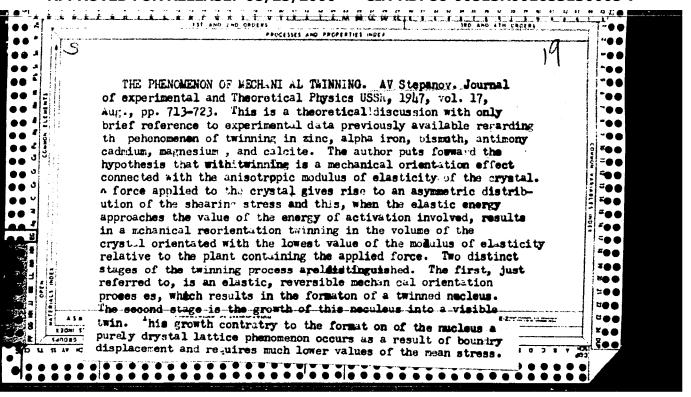


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Arabicial crystal gilding. II. Rucial of craticial gilding.

A. V. Stepanov (Leningrad Phys.-Tech. Inst.). Zhav.

Marair Parair Parair (1948); cf. C.A. 42, 6800/...

Michael Parair Parair (110)-[10] by incident in the direction [100], and perpendicular to the cleavage plane, bring about suciel of perpendicular to the cleavage plane, bring about suciel of perpendicular to the cleavage plane, bring about suciel of perpendicular to the cleavage plane, bring about suciel of perpendicular to the cleavage plane, bring about suciel of perpendicular to the cleavage plane, bring about suciel of perpendicular to the cleavage plane, bring about suciel of perpendicular to the cleavage plane, bring about suciel displacement. These gildings are observed in polarized light on the social plane and anisotropic of a distinguishing characteristics of mech. deformations of circular inordromatic curves appear, while in NaCl, ECl, etc., far could incorporate the fourth order, and the angle included between the disverse the fourth order, and the angle included between the disverse for the resulting optico-clastic phenomena.

Since for ECl the ratio of Young's modulus in [100] to sometical factor for the resulting optico-clastic phenomena. In [111] is 3.2, for NaCl only 1.34, the elastic deformations are characterized by a "concentration" of the deformations are characterized by a "concentration" of the deformations are characterized by a "concentration" of the deformations of the displacements. The lact that surprisingly low forces of the displacements. The lact that surprisingly low forces of the displacements. The lact that surprisingly low forces of the displacements are magnitude of the asplied forces for a given there is a modulus. The lact that surprisingly low forces of the surprisingly of the Berta-Ameriach abs. hardsens indicates, however, the order of sungainade of the asplied forces for a given ever, the order of sungainade of the supplied forces for a given ever, the order of sungainade of the supplied forces for the crys

scratch is produced by the diamond pointer of a Martena Indiana tester, oriented parallel [100] and perpendicular to the [110] chongation. After annealing the crystal for 10 the [110] chongation. After annealing the crystal for 10 the [110] chongation in the [110] direction and the syontaneous gliding is observed at [200] between crossed syontaneous gliding is observed at [200] between crossed incots. The necebanism is that of (100)-[110] gliding, and incots. The necebanism is that of (100)-[110] gliding, and the optical characteristic as at a., C.A. 18, 2447), the clastic limit is faces (cf. Igffe, et al., C.A. 18, 2447), the clastic limit is measured at room temp, to be 800 g./sq. mm. Particularly measured at from temps, the appearance of the gliding heads the changes in starting from the scratch ing launches at different temps, starting from the scratch in stable place in 2 distinct steps: (1) an activation and is taking place in 2 distinct steps: (1) an activation and is taking place in 2 distinct steps: (1) an activation and is taking place in 2 distinct steps: (1) an activation and is taking place in 2 distinct steps: (1) an activation and the scratch are formed at room temp, are unable to grow; they can, however, be developed and observed by temp. incotes which are formed at room temp, are unable to grow; they can, however, be developed and observed by temp. The gliding lameluae appear pair-wise oriented on both sides. The gliding lameluae appear pair-wise oriented on both sides of the scratch; the crystall organish meaning of the fields.

The gliding lameluae appear pair-wise oriented on both sides of the scratch; and perpension, since the plane going through the scratch, and perpensional could be crystal surface, is not a plane of symmetry of dicular to the crystal surface, is not a plane of symmetry of

mer

STEPANOV, A.V.

FA 9/49197

USSR/Physics

Sep 48

Crystallography Crystals - Elastic Properties

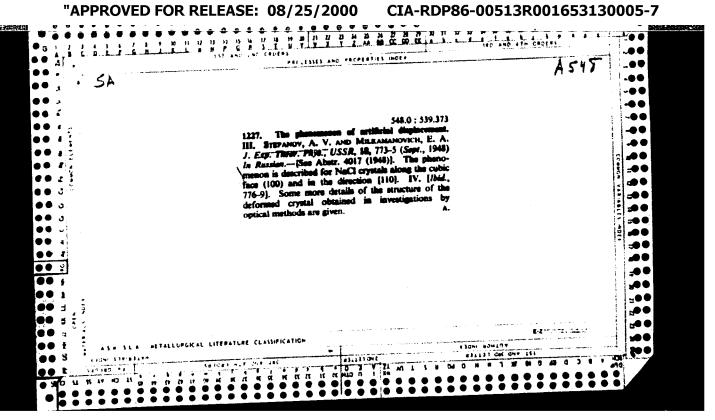
"Optical Limits of the Elasticity of Rock Salt Crystals for Slip Along the Plane of a Cube," A. V. Stepanov, Ye. A. Mil'kamanovich, Leningrad Phys-Tech Inst, Acad Sci USSR, 4 pp

"Zhur Ekeper i Teoret Fiz" Vol XVIII, No 9

Shows results of determination, by optical method, of elastic limit of rock salt crystals for case of slip along plane of a cube (100), and in the direction /1117. Establishes relationship of elastic limit to temperature.

9/49197

CIA-RDP86-00513R001653130005-7



STEPANOV, A. V.

35820. Svoystva prochnosti polimerov v oriyentirovarnom sostoyanii. Zhurnal eksperim.

1 teoret. fiziki, 1949. vyp. 11, S. 973-88.-Bibliogr: 16 nazv.

SO: Letopis' Zhurnal'nykh Statey, Vol. 39, Moskva, 1949

STEPANOV, A. V.			PA	40/49751	
	USER/Engineering (Contd) and results of experiments ties of method, Includes 2 show stress lines in color.	in polarized light. Material used for model is crystalline and behaves similarly to metals. Presents preliminary data on suitable material, 10/49751	"New Optical Method of Studying Stresses in Polarized Light," A. V. Stepanov, Leningrad Physicatech Inst, Acad Sci USSR, 12th pp "Zhur Tekh Fiz" Vol XIX, No 2 p > 05-17 Proposes new optical method to study stress.	USSR/Engineering Stress Analysis Optics	
167/04 1	(Contd) Feb 49 periments showing possibili- Includes 21 diagrams. Some in color. Submitted 14 Sep 46.	Material used for model behaves similarly to metals. y data on suitable material,	Method of Studying Stresses in ght, A. V. Stepanov, Leningrad Inst, Acad Sci USSR, 12th pp iz" Vol XIX, No 2 proj-17 optical method to study stresses	Job 49	

STEPANOV. A. V.

PA 48/49T95

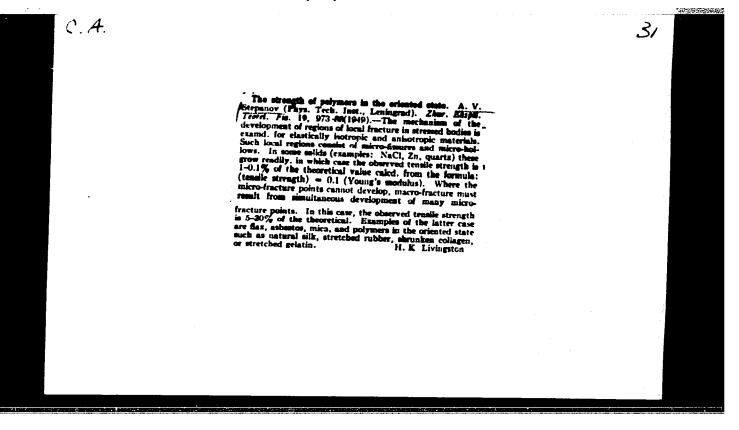
USER/Physics Clearage Apr 49

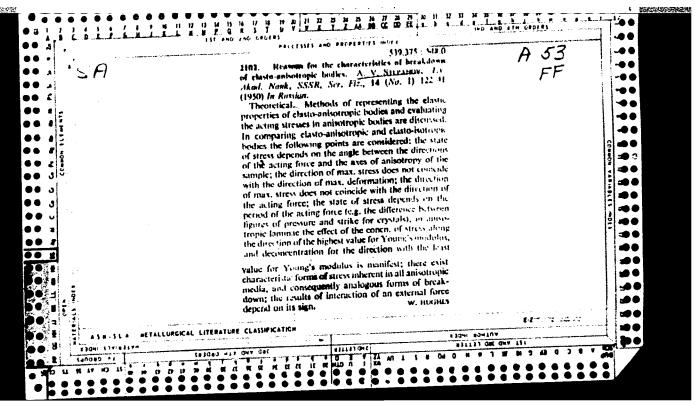
"Cleavage Phenomena," A. V. Stepanov, Leningrad Physicotech Inst, Acad Sci USSR, 141 pp

"Zhur Tekh Fiz" Vol XIX, No 4 p.+42-506

Draws attention to the fact that prerequisites for the presence of the cleavage phenomenon in crystals are to be found in the anisotropy of their elastic properties. Submitted 25 Dec 48.

48/49**T9**5





	USSR/Physics - Quartz Crystals, Twinning	May 50
	"Mechanical Twinning of Quartz," A. V. S Leningrad Physicotech Inst, Acad Sci USS	Stepanov, SR, 4 pp
	"Zhur Eksper i Teoret Fiz" Vol XX, No 5	38-41
	Considers possible existence of relation phenomena of mechanical twinning and elaties of quartz crystals. Submitted 4 No.	n between astic prop er-
	46	160 T1 04

STEPANOV, A. V.

The mechanism of destruction of elastic-anisotropic bodies. Stepanov, A. V.

The Leningrad Physico-Technical Inst. of Acad. of Sci. USSR Aug. 10, 1949.

SO: Journal of Technical Physics, Vol. 20, No. 10. October 1950.

S.A.

Seat. A

Seat. B

1384. The phenomenon of artificial displacement.

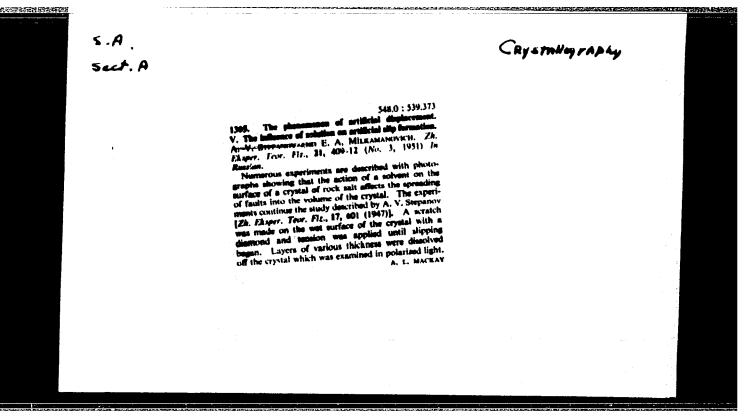
IV. The growth of control of the A. V. Stream.

AND E. A. Milazanorecca. Zh. Espar. Tow. Piz.

21, 401-61 (No. or Abstr. 1227 (1994)). Descriptive.

For P. III. and or crystals of rock saft by the application of a mention of a mention (110) of the phines (110) was produced in crystals of rock saft by the application of a mention concentry to cause sity followed the change of classic limit with temperature.

A. L. MACKAY

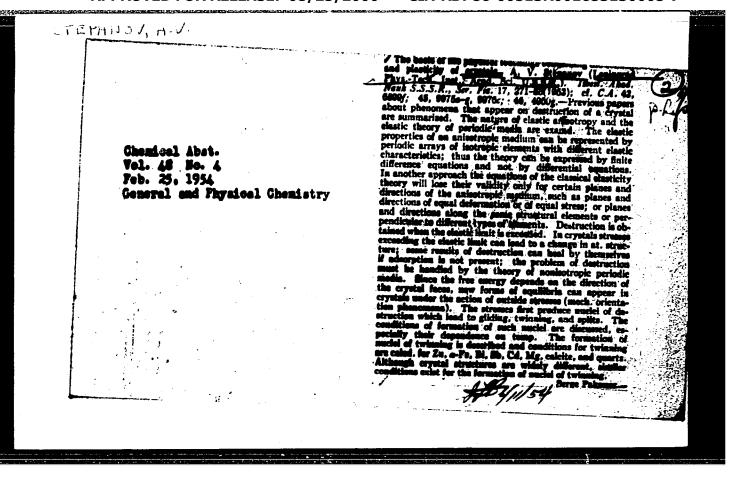


STEPANOV, A. V.; KRASNOV, V. M.

Crystallography.

Optical methods of investigating centers of disintegration. I. Zhur. eksp. i teor. fiz 23, No. 2, 1952.

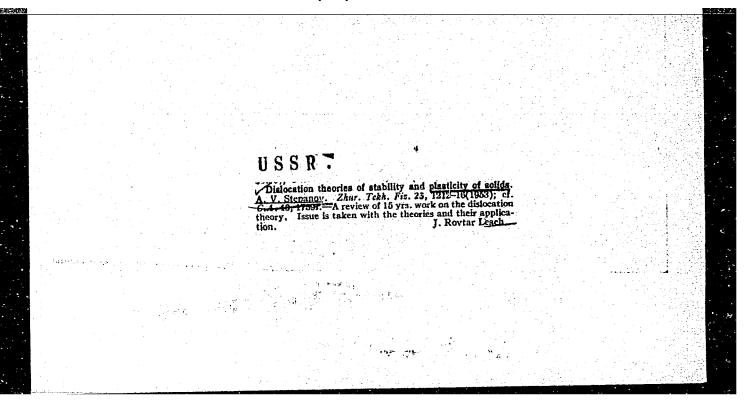
Monthly List of Russian Accessions, Library of Congress, December 1952. Unclassified.

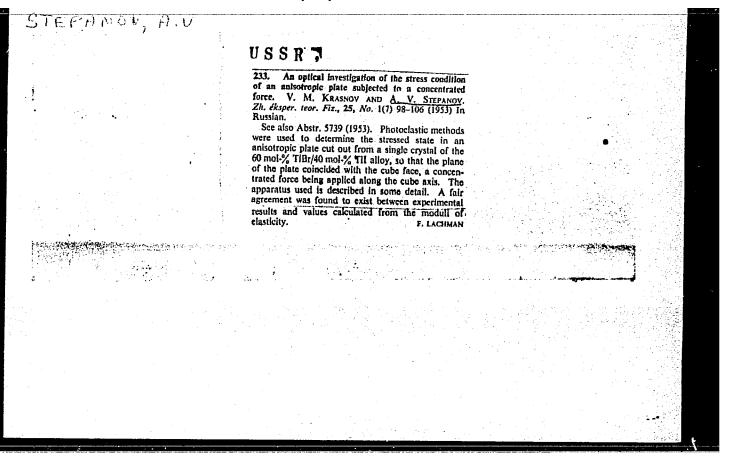


TEPANOL A. J.

Chemical Abst.
Vol. 48 No. 4
Feb. 25, 1954
General and Physical Chemistry

Goals of structural analysis of a deformed crystal in connection with new data concerning the mechanism of slip formation. A. V. Stepanov (Leningrad Phys.-Tech. Inst., Acad. Sci. U.S.S.R.). Izvest. Akao. Total & S.S.R., Ser. Fiz. 17, 342-51(1953).—Before subjection to plastic deformation crystals of NaCl and AgCl were scratched in a Markens app. along (100). This Scratch is a source of "artificial" slips. Photographs in polarized light show how the nucleus of slip was transformed by elongation into a slip pattern. The scratch creates surface and vol. changes that are a function of the extension and depth of the scratch; the resulting slip conserves the optical properties of the nucleus; slips can be mirror-like. "pos." and "neg." If several slip nuclei are created in close proximity to one another they give an interference pattern which can also be observed in natural crystals. Other cases such as the transformation of a reversible slip into an irreversible, the crossing of a first series of slips by a 2nd series are discussed and it is shown that in a deformed crystal there are 7 different regions, each with different properties relative to recrystn., etc. Slip growth was studied by taking motion pictures at a speed of 2 frames per sec. The growth of nuclei is a different process than their formation and the elastic limit corresponds to the load at which slip nuclei start to grow and become visible slips. Artificial slips were observed on NaCl in the temp. interval —195° to 300°. However, the growth of slips in the system (100) (110) is temp.-dependent. Tests to remove the scratch by H₂O showed that the scratch grew in length and in width, i.e. the remanent tensions penetrated deeper. From these tests it is concluded that the region of artificial slips is at a depth of 0.02–0.1 mm. from the surface of the crystal. Surface action has a considerable effect on slips in the vol. of the crystal. In conclusion 11 problems of the structural analysis of crystals are enumerated, to be solved by x-ray analysis.





USSR/Physics - Crystallography

FD-585

Card 1/1

: Pub 153-1/22

Author

: Stepanov, A. V. and Donskoy, A. V.

Title

: New Mechanism of plastic deformation of crystals. I. Study of laminating process by an optic method. II. Determination of crystallographic characteristics of the laminating process.

Periodical

: Zhur. tekh. fiz., 24, 161-183, Feb 1954

Abstract

: Describe new mechanism governing the plastic deformation of crystals called lamination, first discovered by A. V. Stepanov (Izv. ak. nauk SSSR, fiz. 797 (1937)). Consider this phenomenon, together with sliding and twinning, a common property of all crystals, including metals and alloys. Give detailed method of investigation, tables, graphs and pictures. Indebted to A. L. Shakh-Budagov and V. A. Moskiyevskiy of Leningrad Mining Institute. 27 references, including 7 foreign. Reported in the Leningrad Politechnic Institute im M. I. Kalinin in May 1949 and at a meeting of the Commission on Stability,

Acad Sci USSR, in May 1952.

Submitted

: August 15, 1952

STEPANOV, A.V.

Phase transitions in austenitic steels under the action of stresses. Met. i obr.met. no.5: 42-52 N *55. (MIRA 9:3)

(Steel alloys--Metallography)

E-5

572 (GAGEV,

Category: USSE/Solid State Physics - shase Transformation in

Solid Fedies

Abs Jour: Ref Zhur - Fizike, No 3, 1957, No 6632

Author

: Stepanov, A.V. : Investigation of the Segregation of Phesphorus in Steel by Titlc

the Autorediography Lethod.

Orig Fub : Metallovedeniye i chrabothe metallov, 1955, No 7, 55-60

Abstract : No abstract

: 1/1 Card

Card 1/1

Pub. 146-15/20

Author

: Stepanov A. V. and Eydus I. M.

Title

: Relation of Elasticity constants of single crystals of sodium chloride

and silver chloride to temperature

Periodical

: Zhur. Eksp. i Teor. Fiz., 29, No 5, 669-675, 1955

Abstract

: Research, started in previous works by A. V. Stepanov (Sow. Phys. 6, 312, 1934; ibid. 8, 25, 1935; Zhur. Tekh. Fiz., 19, 205, 1949; ZhETF 25, 98, 1953) is continued. Results of determinations of elasticity constants of single crystals of sodium chloride and of silver chloride are tabulated in a temperature range from room temperature to the melting point. Indebted to Ye. M. Yevstaf'yev, and A. L. Shakh-Budagov for discussions. Thirteen references, including

five foreign.

Institution : Leningrad Physico-Technical Institute, Acad. Sci. USSR

Submitted

: March 26, 1953

STEPANOV, A.V

Category: USSR/Solid State Physics - Fechanical Properties of E-9

Crystals and Polycrystelline Compounds

Abs Jour : Ref Zhur - Fizike, No 3, 1957, No 6777

Author : Zhitnikov, R.A., Stepenov, A.V.

Inst : Loningrad Fedagogical Institute, USSR

Title : Optical Method of Investigation of Averaged Stressed States

in Fine Grain Folycrystals. I. Freporation of Fine-Grain

Silver-Chloride lolycrystel Specimens.

Orig Fub: Zh. tekhn. fiziki, 1956, 26, No 4, 772-778 APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001653130005-7"

Abstract: It is proposed that silver chloride be used as a material suitable for the solution of various problems in elasticity and plasticity of polycrystals by optical methods, for it has a considerable piezo-optical activity and its structure is similar to that of metals. Fine-grain specimens, necessary for the study of percoscopically averaged stressed states in polycrystalline media, were prepared by annealing for 1 -- 5 hours at 150°, bars (or rods), pressed with various degrees of deformation from high grade AgCl ingot. The recrystallized bers with grain dimensions 0.1 -- 0.3 mm were

Cord : 1/2

Gategory: USSR/Solid State Physics - Mechanical Properties of

E--9

Crystals and Folycrystalline Compounds

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6777

rolled into ribbons approximately 24 mm wide and approximately w mm thick, while the rods (with grain dimensions 0.05 -- 0 1 mm) were pressed into strips with transverse sections 10 x 2 mm. Both types of strips have a similar structure and consist of grains that have a ribbon-like form and are stretched in the rolling direction or in the pressing direction. To obtain fine grain specimens without a recrystallization texture, the rods were upset between steel plates into plane-parallel laminare approximately 2 mm thick, which acquired after 12 hours' annealing at 100° a fine, very uniform equilibrium grain measuring 0.05 -- 0.07 mm.

Card : 2/2

STEPHNOU

Category: USSR/Solid State Physics - Mechanical Properties of E-9

Crystals and Folycrystalline Compounds

Abs Jour : Ref Zhur - Fizike, No 3, 1957, No 6778

Author : Zhitnikov, R.A., Stepenov, A.V.

: Leningrad Fedagogical Institute, USSR Inst

: Optical Method of Investigation of Averaged Stressed States Title

in Fine Grain Folyerystels. II. Photoclastic Effects in Crystals of the Cubic System in the Case of Plane Loading.

Orig Pub : Zh. tekhn, fiziki, 1956, 26, No 4, 779-785

Abstract : On the basis of the Fockels theory and Krasnov's work on piezo-optical phenomena in crystels, the authors exemine the photoelestic behavior of a plane-parallel plate, cut in en arbitrary direction from a crystal of the cubic system and placed in a plane lorded state. The resultant relationship between the optical path differences of two plane-polarized beens end the principal stresses makes it possible in many particular cases to obtain purely-optical solutions to the problem of the plane-loaded state; namely: to find the

Card : 1/2

ZHITNIKOV, R.A.; STEPANOV, A.V.

Optical method for investigating neutralized stress states in fine-grained polycrystals. Part 3. Photoelastic (piezooptical) properties of polycrystalline silver chloride. Zhur.tekh.fiz. 26 no.4:786-794 Ap 156. (MIRA 9:8)

1. Gosudarstvennyy pedagogicheskiy institut, Leningrad.
(Silver chloride--Optical properties)
(Photoelasticity)

STEPANOV, A.V.; BOBRIKOV, V.P.

Temperature dependence of the photoelasticity limit in the system (111); [011] for table salt crystals. Zhur.tekh.fiz. 26 no.4: 795-799 Ap '56. (MLRA 9:8)

1. Leningredskiy gosudarstvennyy pedagogicheskiy institut. (Sodium chloride--Optical properties)

STEPANOV, A. V.

"On the Study of the Physicomechanical Properties of Heterogeneous and Anisotropic Midia," paper presented at the First All-Union Conference on Tectonophysics, Moscow, 29 January through 5 February 1957.

Physicotechnical Institute, Academy of Sciences USSR

Sum 1563

STEPANOV, A. V.

"On the Problems of modeling Tectonic Phenomena," physicists L. M. Kachanov, Ye. I. Edel'shteyn, G. V. Vinogradov, G. N. Kuznetsov, M. P. Volarovich, and A. V. Stepanov and Geologists F. I. Vol'fson, V. A. Aprodov, N. I. Borodayevskiy, and Yu. S. Shikhin

paper presented at the first All-Union $^{\rm C}$ onference on Tectonophysics, Moscow, 29 Jan - 5 Feb 1957.

Sum 1563

GOL'DEARB, V. M. and STEPANOV, A. V.

"Elantic Constants and Strained Condition of Laminated Nonhomogeneous Media." Voprosy dinamiki i prochnosti (Problems of Dynamics and Strength), Riga, Izd-vo AN Latviyskoy SSR, 1958, 178 pp. (Sbornik Statey, Inst. mashinovedeniya, AN Lat SSR, vyp. 5)

The book is a collection of ten research papers, prepared by members of Acad. Sci. Lat SSR, Latvian State University and the Riga Red Banner Higher Military School for Aeronautical Engineering im. K. E. Voroshilov.

STEPANOV, A. V.

paper presented at the Confe.on Mechanical Properties of Non-Metallic solids, (1876) Leningrad, USSR, 19-26 May 58.

Physical-Technical Institute of the Acad. Sci., USSR, Leningrad.

5/124/61/000/012/033/038 D237/D304

AUTHORS:

Gol'dfarb, V. M., and Stepanov, A. V.

TITLE:

Elastic constants and stress condition of

stratiform heterogenous media

PERIODICAL:

Referativnyy zhurnal, Mekhanika, no. 12, 1961, 6, abstract 12V33 (V sb. Vopr. dinamiki 1 prochnosti, no. 5, Riga, AN LatvSSR, 1958, 127-

. 158)

A stratiform medium is considered, where each layer consists of a different material. The medium is put under stress in such a manner that mean stresses in each layer are constant. It was shown that the given medium can be considered anisotropic, and the method for determining elastic constants in an anisotropic medium with elastic constants of each layer known was given. As an example, stretching of a stratiform model was considered. Each layer, in this case, is shown to be under a

Card 1/2

AUTHOR: Stepanov, A. V.

129-58-7-15/17

TITLE: Precipitation of Carbides During Tempering of Alloy Steels (Vydeleniye karbidov pri otpuske legirovannykh staley)

PERIODICAL: Metallovedeniye i Obrabotka Metallov, 1958, Nr 7, pp 59-61 (USSR)

ABSTRACT: A review of Western practice based on information published in British and American literature.

There are 4 references, all of which are English.

Card 1/1

CIA-RDP86-00513R001653130005-7" APPROVED FOR RELEASE: 08/25/2000

AUTHOR: Stepanov, A.V. 70-3-3-35/36
TITLE: The Theory of Cry: tals of the Rare Gases (K teorii

kristallov blagorcinykh gazov)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 3, pp 392 - 394 (USSR).

ABSTRACT: Various properties of the rare gases can be estimated from the gas kinetic relations and from the rule of Leonard-Jones; U is the lattice energy equal to λ the heat of sublimation, M is the modulus of compressibility and the characteristic temperature. Using well-known formula:

VU = p.D = 8.42 D Kcal/mol; VM = 1.34 k/k dynes/cm²;

v m p/2. The formulae were made appropriate to diatomic molecules so that the constants of the cystal could be related to the constants of the molecule and the influence of the condensation of the atoms on their interactions estimated. For the calculation it was assumed that the smallest distance the calculation it was assumed that the equivalent distance between atoms (k_r) was equal to the equivalent distance (m_r) between atoms in a diatomic molecule and that the crystal was face-centred with co-ordination number 12. A table of the

Card 1/3

The Theory of Crystals of the Rare Gases

70-3-3-35/36

properties of the molecules and crystals is given for He, Ne, A, Kr and Xe where the following data are given: Experimental data for a diatomic molecule, constants in Leonard-Jones' expression, D in kilocals./mol, m, and K; experimental data for real crystals, k_r, λ, M and μ; properties of the crystals as calculated, U, M, and μ; comparison of theoretical and experimental data for crystals, λ/U, M/M, ν/Λ/Λ, and RT_n. R is the gas constant, k is Boltzmann's constant, D is the energy of dissociation and K is the force constant - the superscript V presumably indicates calculated values. The agreement is about 20% in most cases. The following approximate relationships between the crystal constants are found, some being previously known k_r = m_r; λ = U = 1/2 D; T_{m.p.} = T b.p.; T_{b.p.} = 0.56 T_{crit.};

T_{m.p.} = 3.58 x 10² D = 6.10 1/2 D; T_{b.p.} = 3.60 x 10² D = 6.10 1/2 D; T_{crit.} = 6.5 x 10² D = 1.08 x 10² 1/2 D.

Card2/3The above relationships should be applicable also to other