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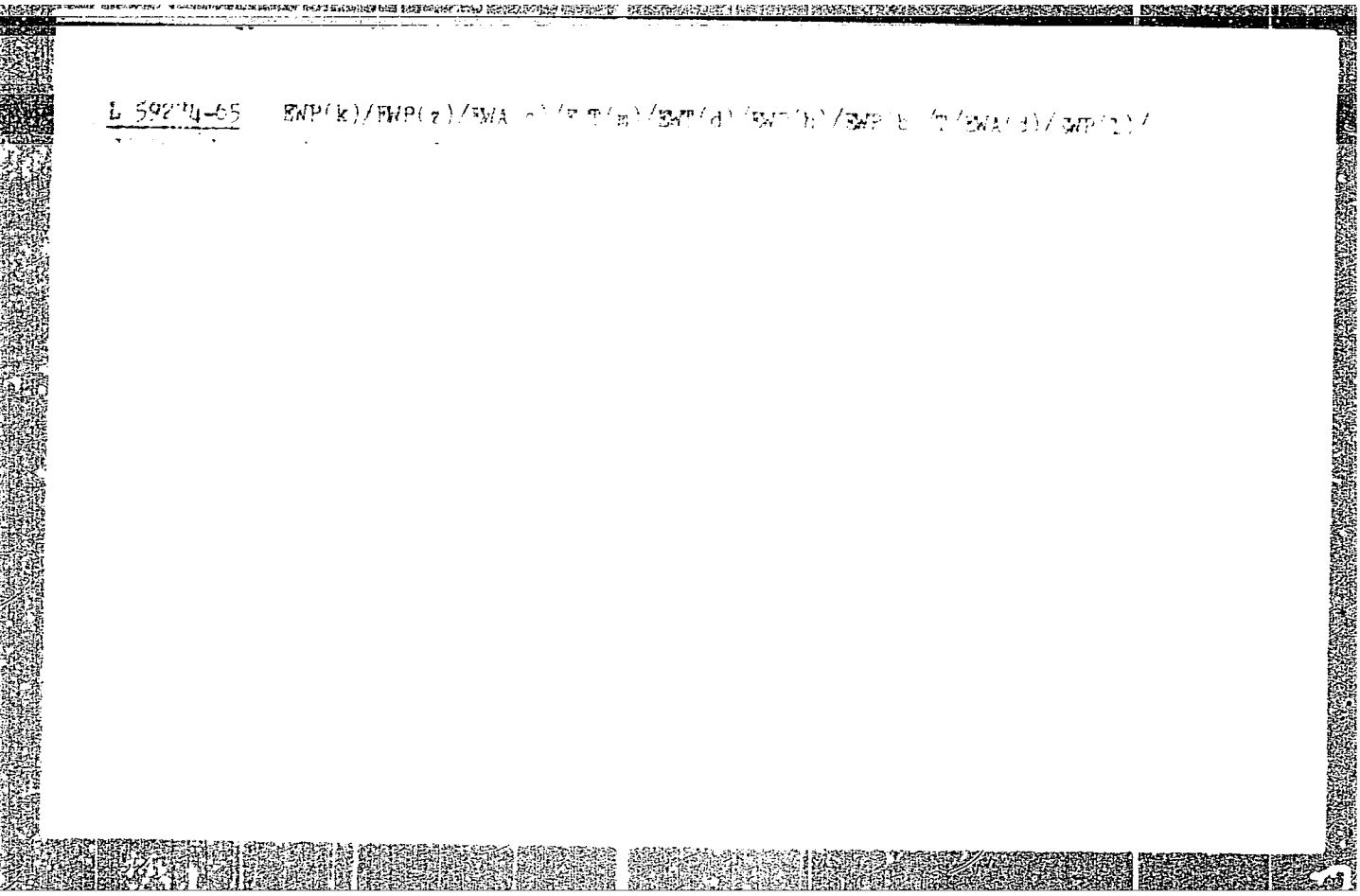

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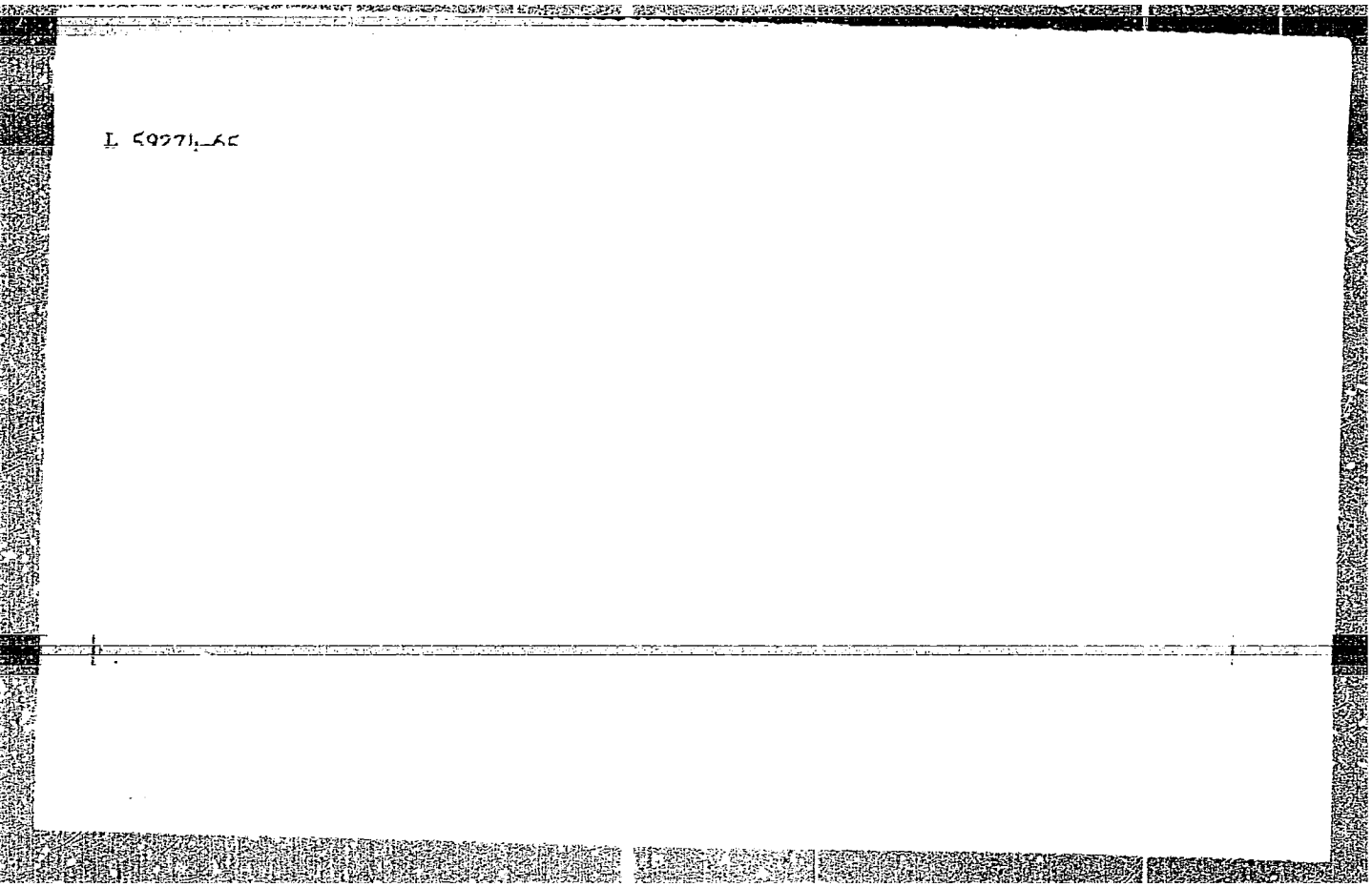

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L 04788-67 EWT(1)

ACC NR: AP6024461 SOURCE CODE: UR/0181/66/008/007/2039/2043

AUTHOR: Poyker, K.; Trifonov, Ye. D.

ORG: Leningrad State University im. A. A. Zhdanov (Leningradskiy gosudarstvennyy universitet) 40 B

TITLE: Selection rules for the vibrational structure in Raman scattering spectra

SOURCE: Fizika tverdogo tela, v. 8, no. 7, 1966, 2039-2043

TOPIC TAGS: selection rule, Raman scattering, Raman spectrum, vibration spectrum, molecular spectroscopy, group theory, resonance scattering

ABSTRACT: In view of the fact that the previously derived selection rules for Raman scattering of light by molecules are valid only for the nonresonant case, the authors present a derivation of selection rules for the vibrational structure of Raman spectra, which include both the resonant and nonresonant cases. The calculation pertains to a nonrotating molecule, such as an impurity center in a crystal, in the adiabatic and harmonic approximation. The group theoretical conditions under which a given transition can appear in the Raman spectrum is derived. Precise selection rules are obtained in the two limiting cases of nonresonant Raman scattering and purely resonant scattering. Selection rules are considered also when the Condon approximation and the linear approximation for the difference of the adiabatic potentials is satisfied. The authors thank M. I. Petrashen', I. V. Abarenkov, and A. A. Kiselev for a useful discussion of the problems considered. Orig. art. has: 16 formulas.

SUB CODE: 20/ SUBM DATE: 02Dec65/ ORIG REF: 007/ OTH REF: 005

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TRIFONOV, Ye.D.; TAMARCHENKO, V.I.

Inverse problem in luminescence theory. Vest. LGU 20 no.16: 21-25 '65. (MIRA 18:9)

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L 01212-66 EWT(1)/T IJP(c) GG
ACCESSION NR: AP5019847 UR/0181/65/007/008/2345/2354

AUTHOR: Trifonov, Ye. D.; Poyker, K. 44,55

TITLE: Contribution to the theory of resonant Raman scattering of light by impurity crystals 21,44,55

SOURCE: Fizika tverdogo tela, v. 7, no. 8, 1965, 2345-2354

TOPIC TAGS: Raman spectrum, resonance line, crystal impurity, excited electron state, phonon, Raman scattering

ABSTRACT: The authors analyze the general formula for the intensity of resonant Raman scattering of monochromatic light by an impurity crystal and derive from it the vibrational structure of the Raman spectra corresponding to several definite models of interaction between the electronic state and the lattice vibrations. The impurity-center density is assumed small enough so that the interaction between these centers can be neglected. Allowance for the motion of the nuclei is made in the adiabatic and harmonic approximations. The results of a numerical calculation of the intensities of the phonon repetitions is presented for the case when the center interacts with one discrete frequency at zero temperature. It is shown that upon interaction with the branch of crystalline oscillations, the continuous Raman spectrum contains a narrow Rayleigh peak, which is the analog of the

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L 01212-66
ACCESSION NR: AP5019847

Mossbauer line. The vibrational structure of the Raman spectra is compared with the structure of the luminescence and absorption spectra. "The authors thank M. I. Petrashen' and K. K. Rebane for a discussion of the problems considered, I. V. Abarenkov for help in the numerical calculations, and A. I. Stekhanov for interest in the work." Orig. art. has: 30 formulas and 1 table. [02]

ASSOCIATION: Leningradskiy gosudarstvennyy universitet (Leningrad State University)

SUBMITTED: 15Feb65 ENCL: 00 SUB CODE: OP, SS

NO REF SOV: 018 OTHER: 001 ATD PRESS: 4099

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[redacted] (MIRA 18:9)

[redacted]

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, YE.D.

FRAME I BOOK EXPLOITATION SOV/5151

Leningrad. Universitet

Molekulyarnaya spektroskopiya (Molecular Spectroscopy) [Leningrad] Izd-vo Leningr. univ., 1960. 198 p. 4,700 copies printed.

Resp. Ed.: P. I. Skripov; Eds.: Ya. V. Shchemelev and V. D. Plastov; Tech. Ed.: S. D. Vodolagina.

PURPOSE: This collection of articles is intended for scientific workers, instructors and students of physics and chemistry. It may also be used by engineers and technicians employing molecular spectroscopy.

COVERAGE: The collection of articles describes spectroscopic studies of liquids and solutions, and includes data on applied molecular spectroscopy. Individual articles deal with the molecular interaction in solutions, and specifically with the hydrogen bond problem. Work on the optimum utilization of spectral apparatus and on the analytical application of molecular spectroscopy are also included.

Aspects of the structure of high and low molecular compounds and of molecular complexes are also covered. The collection was published in honor of the 70th birthday of Professor Vladimir Mikhaylovich Chulanovskiy, Soviet specialist in molecular spectroscopy and spectral analysis. There are no references.

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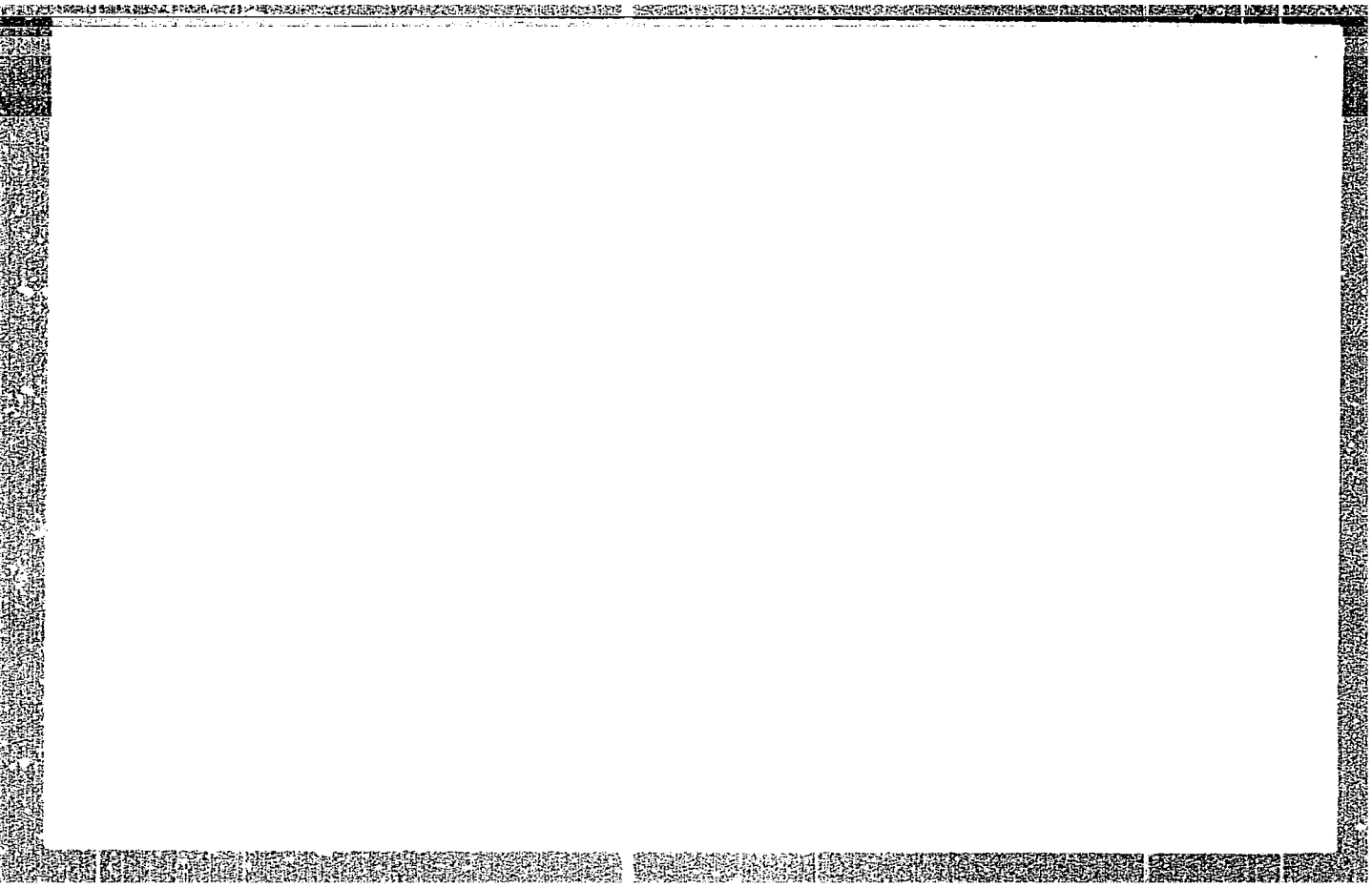

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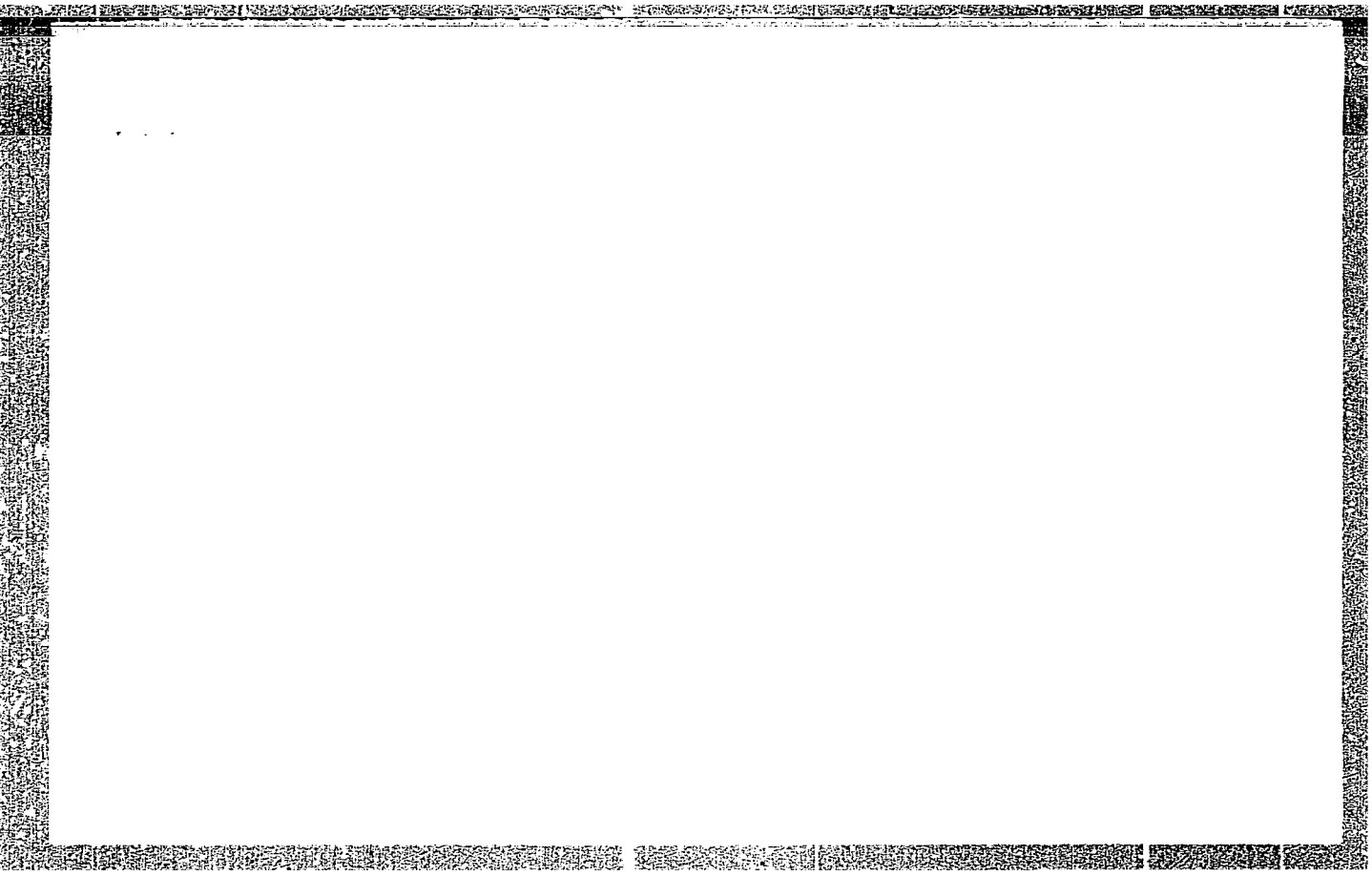

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TRIFONOV, Ye.D.

Correspondence between irreducible representations of rotation and permutation groups [with summary in English]. Vest.LGU 13 no.22:157-162 '58. (MIRA 12:4)
(Quantum theory) (Groups, Theory of)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

REBANE, K.K.; KRISTOFEL', N.N. [Kristoffel, N.]; TRIFONOV, Ye.D.; KHIZHNYAKOV, V.V.

Dynamics of a lattice with impurities and the quasi-line electron-vibration spectra of crystals. Izv. AN Est. SSR. Ser. fiz.-mat. i tekh. nauk 13 no.2:87-109 '64.
(MIRA 17:9)

1. Corresponding Member of the Academy of Sciences of the Estonian S.S.R. (for Rebane).

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

ACCESSION NR: AP4043031 S/0023/64/000/002/0087/0109

AUTHORS: Rebane, K. K.; Kristofel', N. N.; Trifonov, Ye. D.; Khizhnyakov, V. V.

TITLE: Dynamics of a lattice with impurities and quasi-line electron-vibration spectra of crystals

SOURCE: AN EstSSR. Izv. Seriya fiziko-matematicheskikh i tekhnicheskikh nauk, no. 2, 1964, 87-109

TOPIC TAGS: crystal lattice vibration, impurity spectrum, electron spectrum, line spectrum, crystal lattice theory, Mossbauer effect, Raman scattering

ABSTRACT: This survey article brings up to date an earlier report (N. N. Kristofel' and K. K. Rebane, Fizika shchelochno-galoidny*kh kristallov [Physics of Alkali-Halide Crystals] Riga, 1962, p. 32) in light of three major developments that have occurred during the

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elapsed time. The first is the progress in the theory of crystal-lattice dynamics, particularly the character of distortion of the crystal lattice near impurities, which has made it possible to predict various types of oscillations in electron-vibration and related processes. The second is the application of the Mossbauer effect to the study of local lattice dynamics. The third is the better understanding of the closed connection between the interaction with electron-transition vibrations and the analogous problem of gamma transitions in an atomic nucleus contained in the crystal (optical analog of the Mossbauer line and the Shpol'skiy effect). In addition, the number of experimental researches on the direct study of dynamics of the lattice near crystal defects, including local oscillations, has greatly increased during the past few years. It is pointed out in the conclusions that principal interest attaches to further development of the theory of the purely electronic line and performance of exact experiments aimed at ascertaining how narrow they can be and how close the analogy between the Mossbauer line

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and the purely electronic line actually is. Further development of the theory of vibrations of impurity molecules in crystals and further research with the aid of the Mossbauer effect are urged. The section headings are: 1. Introduction. 2. Local and pseudolocal oscillations. 3. Electron-vibration transitions and local lattice dynamics. 4. Raman scattering of light. 5. Infrared absorption spectra. 6. Mossbauer effect and a few other phenomena. 7. Concluding remarks. Orig. art. has: 2 figures, 2 formulas, and 1 table.

ASSOCIATION: None

SUBMITTED: 12Mar64 ENCL: 00

SUB CODE: OP, SS NR REF SOV: 066 OTHER: 068

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APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.D.

Characteristics of the shape of bands in optica spectra of impurity crystals and in the Mössbauer effect. Fiz. tver. tela 6 no.2:462-469 F '64. (MIRA 17:2)

1. Leningradskiy gosudarstvennyy universitet.

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

VOLODICHEVA, M.I.; TRIFONOV, Ye.D.

Shape of lines in paramagnetic resonance spectra of F-centers in alkali halide crystals. Fiz. tver. tela 5 no.11:3333-3334 N '63. (MIRA 16:12)

1. Leningradskiy gosudarstvennyy universitet.

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TRIFONOV, Ye. D., Cand Phys-Math Sci, "Group-theoretical method in the theory of paramagnetic resonance in F-centers." Vil'nyus, 1961. (Min of Higher and Sec Spec Ed USSR, Vil'nyus State Univ im V. Kapsukas). (KL, 3-61, 205).

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.D.

Construction of many-electron coordinate functions [with summary in English]. Vest. LGU 13 no.22:42-47 '58. (MIRA 12:4)
(Electrons) (Wave mechanics)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

SOV/56-34-6-40/51

AUTHOR: Trifonov, Ye. D.

TITLE: Concerning the Problem of the Symmetry of the Many-Electron Schrödinger Wave Function (K voprosu o simmetrii mnogoelektronnoy shredingerovskoy volnovoy funktsii)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 6, pp. 1643-1644 (USSR)

ABSTRACT: The Hamiltonian of this Schrödinger (Shredinger) equation may not contain spin operators. This equation is invariant with respect to the symmetrical group of the exchange of the spatial coordinates of the electrons. The symmetry properties of the many-electron function may be investigated by means of the corresponding Jung (Yung) scheme and the author describes in a few lines the way of this investigation. It is also necessary to take into account 3 Fok conditions, which imply the antisymmetry of the function with respect to 2 groups consisting of k and n - k arguments (2 conditions) and the cyclic symmetry. These conditions are equivalent to the conditions obtained by the above mentioned investigations. The cyclic symmetry implies the impossibility of antisymmetrizing the function with respect to more than n - k coordinates. Then

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Concerning the Problem of the Symmetry of the Many-Electron Schrödinger Wave Function

the author proves the above mentioned equivalence of the conditions. The Fok conditions are necessary and sufficient for a function satisfying these conditions belongs to a sub-space which is transformed according to the irreducible representation of the symmetrical group of the permutations of its arguments. The author thanks Petrashen' for his discussion of this paper. There are 1 figure and 4 references, 3 of which are Soviet.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet (Leningrad State University)

SUBMITTED: March 4, 1958

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

24(5) SOV/54-58-4-5/18

AUTHOR: Trifonov, Ye. D.

TITLE: Establishment of Coordinate Functions for Many-electron Systems (Postroyeniye mnogoelektronnykh koordinatnykh funktsiy)

PERIODICAL: Vestnik Leningradskogo universiteta. Seriya fiziki i khimii, 1958, Nr 4, pp 42-47 (USSR)

ABSTRACT: The author tried to devise a general method for the establishment of Schrödinger wave functions which is not connected with an approximation of complete elimination of the variable and can be derived from the symmetrical properties which are important to these functions. The group theory proved to be suited for this purpose (Refs 3,4). In this paper the most general form of Schrödinger wave functions of a many-electron system with arbitrary spin is found by means of the Young projection operators. Since the Schrödinger equation is invariant with respect to the symmetrical permutation groups of the electron coordinates, the functions corresponding to the eigenvalues of energy must be transformed according to the irreducible representations of the symmetrical groups and, consequently, also in dependence upon the size of the total spin. The irreducible representation is

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Establishment of Coordinate Functions for Many-electron Systems

found to be a distribution of the number n of the electrons to the summands each of which is equal to 2 or 1. This distribution may be plotted by means of Young projection. It is carried out by examples for n = 1, 2, 3, 4, 5 (Table) and the coordinate functions for a system of 4 electrons in the single-electron approximation with the total spin 1 are established. An accurate computation of these functions for the Li atom is given in the paper (Ref 6). The author thanks M. I. Petrashen' for discussion of his paper. There are 1 figure, 1 table, and 6 references, 3 of which are Soviet.

SUBMITTED: June 10, 1958

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

S/0181/64/006/002/0462/0469

ACCESSION NR: AP4013505

AUTHOR: Trifonov, Ye. D.

TITLE: Peculiarities in the form of bands in the optical spectra of impurity crystals and in the Mossbauer effect

SOURCE: Fizika tverdogo tela, v. 6, no. 2, 1964, 462-469

TOPIC TAGS: band form, optical spectrum, impurity crystal, Mossbauer effect, Mossbauer spectrum, distribution function, normal coordinate displacement

ABSTRACT: The spectra of impurity centers in a crystal exhibit a narrow nonphonon peak at low temperatures. With rise in temperature, the peak remains at almost the same width but diminishes in intensity exponentially. During interaction between the center and local vibration, a series of equidistant peaks appears in the spectrum, the relative intensities changing with rise in temperature but the total intensity declining exponentially. The intensity (of the single peak or the sum) depends integrally on the distribution function of normal-coordinate displacement. In this sense the presence of a deltoid property in the spectral curve is absolute. The author shows that the properties of the spectral curve are associated with

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ACCESSION NR: AP4013505

similar properties in the distribution function of normal-coordinate displacement. He has obtained an expression for probability density and has investigated this function with its first and second derivatives, determining the values at which each has deltoid properties. Breaks in the first derivative or breaks in the spectral curve are associated with breaks in the distribution function and with breaks in the first derivative of this function. The basic approximations used by the author in this study are the adiabatic, harmonic, and Condon. The peculiarities in distribution function of crystal frequencies and the properties of impurity centers give rise to a structure in the Mossbauer effect that is correlative with the structure in the impurity-crystal spectrum. "The author expresses his thanks to M. I. Petrashen' and K. K. Rebane for valuable discussions and remarks." Orig. art. has: 1 table and 28 formulas.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet (Leningrad State University)

SUBMITTED: 05Aug63 DATE ACQ: 03Mar64 ENCL: 00

SUB CODE: PH NO REF SOV: 006 OTHER: 008

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

REBANE, K. K.; TRIFONOV, Ye. D.; KHIZHNYAKOV, V. V.;

"Quasi-Linear Electron-Vibrational Spectra and their Relation to the Mossbauer Effect."

report submitted to 11th Intl Spectroscopy Colloq, Belgrade, 30 Sep-4 Oct 63.

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

ACCESSION NR: AP4000165 S/0181/63/005/011/3333/3334

AUTHORS: Volodicheva, M. I.; Trifonov, Ye. D.

TITLE: Line shape in EPR spectra of F centers in alkali halide crystals

SOURCE: Fizika tverdogo tela, v. 5, no. 11, 1963, 3333-3334

TOPIC TAGS: EPR, electron paramagnetic resonance, electron paramagnetic resonance spectrum, F center, F center electron paramagnetic resonance, phononless transition, radio-frequency energy absorption, F center energy absorption, F center radio-frequency energy absorption, electronspin resonance, ESR, EPMR

ABSTRACT: The authors have used a formula obtained from M. A. Krivoglaz and S. I. Pekar (Tr. IFAN USSR, vy*p. 4, 37, 1953) in studying electron paramagnetic resonance; i.e., they have used a formula obtained for optical spectra. They have shown that the energy of the radio-frequency field is absorbed chiefly during non-phonon transition corresponding to a very narrow line in the absorption spectrum. The equation for energy they have derived is

$$U_i = \sqrt{\frac{2}{L^3}} \sum_{\varkappa\alpha} \sqrt{\frac{\hbar}{\rho\omega_{\varkappa\alpha}}}\, q_{\varkappa\alpha} \sin\left(\varkappa R_i + \frac{\pi}{4}\right), \qquad (1)$$

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ACCESSION NR: AP4000165

where L is the dimension of the basic zone of cyclicity, ν the wave vector of the phonons, α the number of oscillation branches, and ρ the density of the crystal. Numerical computations were made for a crystal of KCl at 300K. The probability density of nonphonon transitions--exp(-5·10-10)--is very near unity. That is, as the problem was set up by M. F. Deygen and A. B. Roytsin (ZhETF, 38, 489, 1960), the line degenerates into a deltoid peak, and, consequently, the data obtained by Deygen and Roytsin relative to the widths of individual lines of electron paramagnetic resonance are erroneous. "In conclusion we wish to express our thanks to M. I. Petrashen' for a number of valuable suggestions." Orig. art. has: 5 formulas.

ASSOCIATION: Leningradskiy gosudarstvenny*y universitet (Leningrad State University)

SUBMITTED: 03Jul63 DATE ACQ: 02Dec63 ENCL: 00

SUB CODE: PH NO REF SOV: 004 OTHER: 000

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

LEDOVSKAYA, Ye.M.; TRIFONOV, Ye.D.

Application of the theory of groups to the calculation of the electronic and vibrational properties of molecules. Vest.LGU 17 no.10:21-37 '62. (MIRA 15:5)
(Molecular dynamics) (Groups, Theory of)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

24(5) SOV/54-58-4-14/18

AUTHOR: Trifonov, Ye. D.

TITLE: Correspondence of the Irreducible Representations of the Rotation Group and the Permutation Group (Sootvetstviye mezhdu neprivodimymi predstavleniyami gruppy vrashcheniy i gruppy perestanovok)

PERIODICAL: Vestnik Leningradskogo universiteta. Seriya fiziki i khimii, 1958, Nr 4, pp 157-162 (USSR)

ABSTRACT: Certain quantum mechanical systems consisting of equivalent subsystems are at the same time invariant with respect to rotations in tridimensional space and with respect to any permutations of the subsystems, the latter being invariant themselves with respect to rotation. In this case a certain correlation exists between the properties of symmetry of the wave functions of these systems with respect to rotation and permutation groups; this correlation occurs as correspondence of the irreducible representations of these groups. The form of this correspondence for particles with the spin 1/2 was investigated by means of the group-theoretical methods by Wigner and Weyl and without the group theory set up by V. A. Fok (Ref 3). This form of cor-

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APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

Correspondence of the Irreducible Representations of the Rotation Group and the Permutation Group

respondence is, however, also of interest for other spin values, e.g. in the case the atomic nucleus takes over the role of the equivalent subsystem. In the present paper the most general form of this correspondence is investigated for any spin. The basis of this representation is a tensor of the n-order in the space of the irreducible representation with the weight L of the rotation group shortly designated as L-tensor. For the representation of its components $(2L+1)^n$ first of all the n irreducible representations with the weight L are wanted; the representation of the rotation group is carried out by means of matrices $[A]_n$ and of the permutation group by means of the matrices $p([E]_n)$; E is a (2L+1)-series unit matrix. As the two matrices commute according to Shur's lemma it can be shown that the character of the representation of the rotation group introduced by an irreducible representation of the permutation group is equal to the corresponding elementary characteristic $\Phi_{(\lambda)}$:

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Correspondence of the Irreducible Representations of the Rotation Group and the Permutation Group

$$a^{(\lambda)}(A) = \frac{1}{n!} \sum_{(\alpha)} \vec{k}^{(\alpha)} \chi^{(\alpha)}_{(\lambda)} S_1^{\alpha_1} S_2^{\alpha_2} \ldots S_n^{\alpha_n} \equiv \Phi_{(\lambda)}. \quad k_i \text{ are the}$$

elements of the matrix $[E]_n$. Further, an investigation is made of the number $n_{(\lambda)1}$ of the irreducible representations contained in a certain representation $M_{(\lambda)}(A)$ (rotation group) as well as the number of irreducible representations of the permutation group. Finally, the elementary characteristics $\Phi_{(\lambda)}$ of 1-tensors and of $\frac{3}{2}$-tensors of the order r are investigated and for the latter case the expressions for $n_{r,l}$ for various r and l (l is a whole number, $\leq r$) are listed in a table. In conclusion the author thanks M. I. Petrashen' for discussions. There are 1 table and 9 references, 7 of which are Soviet.

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

BRATTSEV, V.F.; TRIFONOV, Ye.D.

Integral representation of Green's function of the energy operator for a particle in a Coulomb field. Vest LGU 17 no.16:36-39 '62. (MIRA 15:9)

(Quantum field theory) (Potential, Theory of)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

L 23517-66 EWT(l)/T IJP(c) GG

ACC NR: AT6008329 SOURCE CODE: UR/2613/64/000/027/0003/0016

AUTHOR: Rebane, K. K.; Trifonov, Ye. D.; Khizhnyakov, V. V.

49
48
B+1

ORG: none

TITLE: Quasi-line vibrational electron spectra and their relationship to the Mössbauer effect

SOURCE: AN EstSSR. Institut fiziki i astronomii. Trudy, no. 27, 1964. Issledovaniya po teorii tverdogo tela (Research on the theory of solids), 3-16

TOPIC TAGS: line spectrum, vibration spectrum, Mossbauer effect, crystal theory, cadmium sulfide, crystal impurity, electron spectrum, temperature dependence

21,4915

ABSTRACT: The authors briefly review the literature on the theory of quasi-line vibrational electron spectra in impurity crystals. Fundamental formulas are given which describe vibrational electron spectra and their relationship to temperature. The theoretical conclusions are compared with experimental data for the 488.6 angstrom line in a cadmium sulfide crystal. Experimental curves for the temperature relationship of the CdS emission spectrum near this line show qualitative confirmation of the theoretical conclusions. The ratio of the integral intensity of the pure electron line to that of the phonon section of the curve (due here to acoustic vibrations of the lattice) falls rapidly with an increase in temperature. The distribution of Stokes

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L 23517-66

ACC NR: AT6008329

losses shows a maximum at approximately 6 cm^{-1}, i. e. the strongest interaction is with vibrations having a wavelength of 10-20 lattice constants. A great similarity is observed between the Mössbauer effect and quasi-line vibrational electron spectra. The main difference between the two phenomena is that recoil energy is of prime importance in the Mössbauer effect while Stokes losses play the leading role in quasi-line vibrational electron spectra. The second approximation of perturbation theory is sometimes required for explaining the Mössbauer effect with respect to the natural width of the excited level. Orig. art. has: 2 figures, 1 table, 6 formulas.

SUB CODE: 20/ SUBM DATE: 01Nov63/ ORIG REF: 029/ OTH REF: 010

Card 2/2

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye. D.

On the probability of phononless transitions in impurity centers of crystals. Dokl. AN SSSR 147 no.4:826-828 D '62. (MIRA 16:1)

1. Leningradskiy gosudarstvennyy universitet im. M. V. Lomonosova.

(Quantum theory) (Crystal lattices)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

68916

5.4130

AUTHOR: Trifonov, Ye. D.

S/054/60/000/01/003/022
B013/B007

TITLE: The Theory of the Paramagnetic Resonance of F-Centers

PERIODICAL: Vestnik Leningradskogo universiteta. Seriya fiziki i khimii, 1960, Nr 1, pp 22-25 (USSR)

ABSTRACT: The present paper deals with the interesting possibility of changing the width of the absorption bands by changing the temperature. In ·s investigation the author considers the hyperfine interaction of an electron with the nuclei of the six ions of the first coordination-sphere. According to Shul'man's estimate, consideratio of the second coordination-sphere in NaCl changes the total absorption width by 2%, in KCl by 19%. The author also mentions the previous papers by Deygen, Zevin, and Shul'man (Ref 3). He further proceeds from the assumption that the six ions of the firs coordination sphere form a quasimolecule, which is located in the field of the remaining ions. Ion oscillations near the lattice disturbances are nearly normal, and consequently the oscillation energy of these ions and the energy of the rest of the crystals is nearly additive. As shown by a comparison with the experiment, calculation of the frequencies of local oscillations carried out in the approximation of quasimolecules gives a satisfactory result.

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The Theory of the Paramagnetic Resonance of F-Centers

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B013/B007

For the purpose of determining the law of distribution of the total spin projections of the six nuclei, the author investigates the various spin modifications of the quasimolecule. They are determined according to the irreducible representations $D(\lambda)$ of the permutation group of the six nuclei. Each of these six modifications has a certain distribution of total spin, and, consequently, also of spin projection. The results found by means of a formula previously (Ref 11) derived by the author are given in a table. At high temperatures the relative contents of each modification is determined by the number of the corresponding spin-states. In this case, the law of distribution of total spins and of their projections corresponds to the chance distribution of the spin projections of each nucleus. Thus, such a distribution is e.g. $0^{580}{}_1{}^{546}{}_2{}^{456}{}_3{}^{336}{}_4{}^{216}{}_5{}^{120}{}_6{}^{56}{}_7{}^{21}{}_8{}^{6}{}_9{}^{1}$. The absorption band half-width corresponding to this distribution is $\Delta\nu_{1/2} = 6.8\,\frac{2A}{h}$. The attached table shows the distribution of spins and their projections for the various modifications. The relative portion of modifications at low temperatures may be

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

The Theory of the Paramagnetic Resonance of F-Centers

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B013/B007

determined by means of the statistical sums $Z(\lambda) = \sum_E g_{\lambda E} e^{-E/kT}$, where summation extends over all oscillation-energy levels. A formula is also written down for the statistic weight. Near absolute zero, the quasimolecule is in the vibrational ground state. This state consists of a mixture of the two modifications $D(3^2)$, $D(2^2 1^2)$ with equal relative contents. The half-width of the absorption band decreases during temperature measurement from room temperature to absolute zero by about 26%. Thus, the result obtained by the present theoretical investigation (which is based upon the possibility of separating the energy state of the six ions located nearest to vacancy) approaches the experimental modification of the half-width of the absorption band. The author thanks M. I. Petrashen' and F. I. Skripov for their interest in this paper and for critical remarks. There are 1 figure, 1 table, and 11 references, 5 of which are Soviet.

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APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

S/081/62/000/002/001/107
B149/3108

AUTHOR: Trifonov, Ye. D

TITLE: Construction of antisymmetrical wave functions

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 2, 1962, 7, abstract 2B17 (Sb. "Molekulyarn. spektroskopiya". L., Leningr. un-t 1960, 174-183)

TEXT: The relationship among the various methods of construction of the antisymmetrical wave function ψ of n-electrons from independent coordinate and spin functions, on condition that ψ is an eigenfunction of the square of the total spin, is considered from the viewpoint of the theory of permutation groups. [Abstracter's note: Complete translation.]

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APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

35345
S/054/62/000/001/001/011
B102/B112

24.4400

AUTHORS: Novozhilov, Yu. V., Trifonov, Ye. D.

TITLE: Axiomatic method in the quantum-field theory and the properties of symmetry of elementary particles

PERIODICAL: Leningrad. Universitet. Vestnik. Seriya fiziki i khimii, no. 1, 1962, 5 - 10

TEXT: The symmetry properties of elementary particles are studied, which result when the following two postulates are added to the ordinary postulates of quantum mechanics and relativistic invariance (I and II): It is assumed that there is a unique, relativistically invariant, uniform empty space $|0\rangle$ (III), and that the energy spectrum is positive (IV). A quantum theory based on postulates I - IV has been developed by A. S. Wightman et al., whose functions are used in the representation

$$W_{\varphi_1,\ldots,\varphi_n}(\zeta_1,\ldots,\zeta_{n-1}) = \prod_{i=1}^{n} S_{\varphi_i}^{-1}(\Lambda_C)\, W_{\varphi_1,\ldots,\varphi_n}(\Lambda_C\zeta_1,\ldots,\Lambda_C\zeta_{n-1}), \qquad (3)$$

$$S^{-1}(\Lambda)\,\varphi(\Lambda\xi) = U(\Lambda)\,\varphi(\xi)\,U^{-1}(\Lambda),$$

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Axiomatic method in the ...

resulting from the invariance under the complex proper Lorentz group $L_+(C)$. $\varphi_1 \ldots\ldots \varphi_n$ refer to a field with spin, and $U(\Lambda)$ is a unitary representation of the homogeneous Lorentz group in the Hilbert space. From the invariance of the analytic continuation of the Wightman functions under the complex group $L_+(C)$ it follows that the physical theory is of higher symmetry than would follow from the invariance of the Wightman functions under the space group L_+. $W_{\varphi_1 \ldots\ldots \varphi_n}(\xi_1, \ldots\ldots \xi_{n-1})$ are invariant under $L_+(C)$ only in the complex region. In order to ascertain whether there exist symmetry properties of $W_{\ldots}$ in the complex region, which could be represented as additional symmetry properties of $W_{\ldots\ldots}$ in the physical region, a transformation group R is determined, which is different from $L_+(C)$ and for which $W_{\varphi_1 \ldots\ldots \varphi_n}(R\rho_1 \ldots, R\rho_{n-1}) = \prod L_R(\varphi_i) W_{\varphi_1 \ldots\ldots \varphi_n}(\rho_1 \ldots\ldots, \rho_{n-1})$, where $\rho' = R\rho_i$ are Jost points. It is shown that R can be represented as a product of the real Lorentz group L_+

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and of a group R^0 : $R = L_+ \times R^0$, where R^0 can be found with the $\underline{K}$ operators of

$$L^{(1)} = \frac{1}{4}[H+F+H'+F'], \quad K^{(1)} = \frac{1}{4}[H+F-H'-F'], \qquad (11),$$
$$L^{(2)} = \frac{1}{4}[H-F+H'-F'], \quad K^{(2)} = \frac{1}{2}[H-F-H'-F'].$$

$$H = i(M_{32}, M_{13}, M_{21}), \quad H' = i(N_{33}, N_{13}, N_{21}), \qquad (8);$$
$$F = (M_{01}, M_{02}, M_{03}), \quad F' = (N_{01}, N_{02}, N_{03}).$$

M and N are real. Thus, for example, R_1^0 with Euclidean metrics (rotation in four-space) reads $D_1(\sigma) = 1 + i\underline{K}^{(1)}\vec{\sigma}_1 + i\underline{K}^{(2)}\vec{\sigma}_2$, where $\vec{\sigma}$ are real parameters; in pseudo-Euclidean metrics (R_2^0), $D_2(\gamma) = 1 + i\underline{K}^{(1)}\vec{\gamma} + i\underline{K}^{(2)}\vec{\gamma}$*, where γ is an infinitely small complex parameter. Thus, the physical transformation R is achieved by two independent transformations: (1) the real proper Lorentz transformation, and (2) R_i^0 which refers to internal degrees of freedom only. It is shown that R_1^0 can be identified with the

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

Axiomatic method in the ...

four-dimensional isospin group. Academician V. A. Fok is thanked for discussions. There are 3 non-Soviet references. The reference to the English-language publication reads as follows: A. S. Wightman. Phys. Rev., 101, 860, 1956. (S. S. Schweber. Introduction to the Relativistic Quantum Field Theory. Row, Peterson and Co, 1961).

SUBMITTED: December 20, 1961

Card 4/4

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

S/054/62/000/002/003/012
B163/B138

AUTHORS: Ledovskaya, Ye. M., Trifonov, Ye. D.

TITLE: Application of group theory to the calculation of electronic and vibrational properties of molecules

PERIODICAL: Leningrad. Universitet. Vestnik. Seriya fiziki i khimii, no. 2, 1962, 21-37

TEXT: Two methods of constructing molecular wave functions or normal oscillations of a given symmetry are known. The first method is based on the construction of projection operators on invariant subspaces by means of characters or matrix elements of the corresponding representations. A drawback of this method is the difficulty of finding independent bases of equivalent irreducible representations. In the second method, first a set of functions is chosen, which are transformed into each other by the symmetry operations of the group considered, and then a reducing matrix is constructed. This method is complicated by the necessity of solving a system of many equations for the determination of the coefficients of the reducing matrix. By a decomposition of the reducible space of wave

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

functions and deviations of nuclei from their equilibrium positions into irreducible invariant subspaces, the diagonalization of the energy matrix is much simplified. A method of constructing an independent basis by means of an operator $P_{ik}^{(\alpha)}$ corresponding to an irreducible representation of the symmetry group is discussed. Two examples of the application of the method are given; the molecular orbits for the pyrene molecule and the normal oscillation modes of a quasi-molecule in an NaCl crystal are studied. The matrices of irreducible representations of point groups, which are required for the construction of the operator $P_{ik}^{(\alpha)}$, are given in an appendix. There are 13 figures and 10 tables.

SUBMITTED: February 10, 1962

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

NOVOZHILOV, Yu.V.; TRIFONOV, Ye.D.

Axiomatic approach in quantum field theory, and the symmetric properties of elementary particles. Vest.LGU 17 no.4:5-10 '62. (MIRA 15:3)

(Quantum field theory)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

S/054/62/000/003/002/010
B102/B186

AUTHORS: Brattsev, V. F., Trifonov, Ye. D.

TITLE: Integral representation of the Green function of the energy operator for particles in the Coulomb field

PERIODICAL: Leningrad. Universitet. Vestnik. Seriya fiziki i khimii, no. 3, 1962, 36-39

TEXT: This representation is obtained by stereographical projection of the momentum space on the four-dimensional unit sphere. For the Green function $G(p,p',E)$ of the energy operator

$$H\Psi(p)=\frac{1}{2}p^2\Psi(p)-\frac{z}{2\pi^2}\int\frac{\Psi(p')\,dp'}{|p-p'|^2}$$

of a hydrogen-like atom satisfying the equation

$$\frac{1}{2}p^2G(p,p',E)-\frac{Z}{2\pi^2}\int\frac{G(p'',p',E)\,dp''}{|p-p''|^2}-EG(p,p',E)=\delta(p-p') \qquad (1),$$

or for $E<0$ in the Fok representation satisfying the equations

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Integral representation of ...

$$g(\omega_{pp'}, \lambda) - \frac{\lambda}{2\pi^2}\int \frac{g(\omega_{pp''}, \lambda)}{4\sin^2\frac{\omega_{pp''}}{2}}\, d\Omega_{p''} = \Delta(\omega_{pp'}) \qquad (2)$$ and

$$g(\omega_{pp'}, \lambda) = (2p_0)^{-3}(p^2+p_0^2)^2(p'^2+p_0^2)^2 G(p, p', E). \qquad (3),$$

$g(\omega_{pp'}, \lambda)$ is determined in successive approximation. In integral representation

$$g(\omega_{pp'}, \lambda) = \Delta(\omega_{pp'}) + \lambda k_0(\omega_{pp'}) + \lambda^2 \int_0^1 \frac{dr}{r^\lambda(1-2r\cos\omega_{pp'}+r^2)} \qquad (6)$$

is derived. Hence

$$G(p, p', E) = \frac{2}{p^2+p_0^2}\delta(p-p') + \frac{2Z}{\pi^2(p^2+p_0^2)^2(p'^2+p_0^2)^2|p-p'|^2} +$$
$$+ \frac{8p_0}{\pi^2(p_0^2+p^2)(p'^2+p_0^2)}\int \frac{dr}{r^{Z\cdot p_0}\left[(1-r)^2(p^2+p_0^2)(p'^2+p_0^2)+2rp_0^2|p-p'|^2\right]}$$

in Re $E < -Z/2$ is obtained from (3) for the integral representation of the

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S/054/62/000/003/002/010
B102/B186

Integral representation of ...

Green function.

$$\widetilde{G}\left(p, p', \frac{1}{2}\right) = \frac{8}{(p^2+1)^2(p'^2+1)^2} \lg \omega \begin{cases} \frac{3}{2}\omega, & 0 \leqslant \omega \leqslant \frac{\pi}{2}, \\ \frac{3}{2}\omega - \pi, & \frac{\pi}{2} \leqslant \omega \leqslant \pi. \end{cases}$$

holds in particular for the hydrogen ground state. The English-language references are: S. Okubo, D. Feldman. Phys. Rev. 117, no. 1, 292, 1960; E. H. Wichmann, Ching-Hung Woo. Math. Phys. 2, 178, 1961.

SUBMITTED: February 5, 1962

Card 3/3

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.D.

Symmetry of the multielectron Schrödinger wave function.
Zhur.eksp. i teor.fiz. 34 no.6:1643-1644 Je '58. (MIRA 11:9)

1. Leningradskiy gosudarstvennyy universitet.
(Quantum theory)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.D.

Irreducible representations of a four-dimensional rotation group [with summary in English, p.151]. Vest. Len. un. 12 no.4:25-30 '57. (MLRA 10:4)

(Quantum theory)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.D.

Contribution to the theory of paramagnetic resonance of F-centers.
Vest. LGU 15 no.4:22-25 '60. (MIRA 13:2)
(Alkali halide crystals--Spectra)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

66474

SOV/20-129-1-20/64

~~24(7)~~ 24.6100, 5.4130

AUTHOR: Trifonov, Ye. D.

TITLE: A New Method of Calculating the Statistical Weights of Rotation Levels in Polyatomic Molecules

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 1, pp 74 - 76 (USSR)

ABSTRACT: To calculate the thermodynamic functions of polyatomic gases as well as for several problems of radio-spectroscopy and of nuclear physics, the values of the statistical weights of rotation levels in molecules are necessary. A group-theoretical method, suggested by E. Wilson (Ref 1), to determine these weights, was developed and simplified by I. N. Godnev (Ref 2). The method, suggested in the present paper, represents a further simplification of the above-mentioned methods. First, the author investigates a molecule, which exhibits, besides different nuclei, also a totality of n similar nuclei with the spin s. The molecule is assumed to exist in fundamental state, with respect to the electrons and to the oscillations. Then, the wave functions, which are referred to the coordinates and which correspond to a certain

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

A New Method of Calculating the Statistical Weights of Rotation Levels in Polyatomic Molecules

rotational state, form the space R_0. Within this space, a certain representation of the internal group of rotation of the molecule is realized. Internal group of rotation, is the name for the group of symmetry of the ellipsoid of inertia of the molecule. The transpositions of similar nuclei, which cannot be realized by rotation, enlarge the space R_0 to $R = \sum_i^{\oplus} g_i R_0$. g_i is determined by decomposing the permutation group G of the similar nuclei into the conjugate totalities $G = H + g_1 H + \ldots + g_m H$. The representation D_1 of the total permutation group is realized in the space R. Obviously, the irreducible representation $D_{(\lambda)}$ of the group G, which is given by the decomposition $(\lambda) = (\lambda_1 \geqslant \lambda_2 \geqslant \ldots \geqslant \lambda_n)$ of the number n, is contained $d_{(\lambda)}^{(1)}$ times in D_1. Also in the space of the spin functions of the nuclei a certain representation D_2 of the permutation group exists. The irreducible representation $D_{(\lambda)}$

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

A New Method of Calculating the Statistical Weights of Rotation Levels in Polyatomic Molecules

is contained $d\binom{2}{\lambda}$ times in D_2. The statistical weight of the rotational state defined by the number of the linearly independent symmetrical or antisymmetrical wave functions, which may be composed of products of the spin- and coordinate functions, which correspond to this state. This means, therefore, the number of symmetrical or antisymmetrical representations, which are contained in the direct product $D_1 \times D_2$. This number may be easily found. The formulas of the statistical weights are written in explicit form. In some cases, the method, discussed in the present paper, yield a significant shortening of the computations. The characteristic peculiarity of this method, compared to the method by Wilson and Godnev, lies in the fact, that not the irreducible representations of the molecular point group, but the irreducible representations of the permutation group are used. The new definition of the molecular spin-modifications may be introduced: The spin-modification of a molecule signifies a state of the molecule of such kind, that the symmetry of its spin-function is defined by one of the irreducible representations of the point group.

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

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A New Method of Calculating the Statistical Weights of Rotation Levels in Polyatomic Molecules SOV/20-129-1-20/64

Another definition results from this consideration: A spin-modification of the molecule means the state of a molecule of such kind, that the symmetry of its spin-function is determined by one of the irreducible representations of the permutation group. The second definition is more correct, because the symmetry of a wave function has to be defined with respect to the complete symmetry group, and not with respect to a subgroup. There are 6 references, 4 of which are Soviet.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova (Leningrad State University imeni A. A. Zhdanov)

PRESENTED: June 27, 1959, by V. A. Fok, Academician

SUBMITTED: June 10, 1959

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APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

AP6003611 SOURCE CODE: UR/0054/65/000/003/0021/0025

AUTHOR: Trifonov, Ye. D.; Tamarchenko, V. I.

ORG: Leningrad State University (Leningradskiy gosudarstvennyy universitet)

TITLE: Reverse problem in the theory of luminescence

SOURCE: Leningrad. Universitet. Vestnik. Seriya fiziki i khimii, no. 3, 1965, 21-25

TOPIC TAGS: luminescence, cadmium sulfide, electron transition, impurity center, crystal lattice vibration, distribution function

ABSTRACT: The reverse problem relates to restoring the distribution function of the displacements of normal coordinates of a crystal by using experimental emission or absorption spectra (considered to have mirror symmetry). This distribution completely characterizes the interaction of an electron transition in an impurity center with vibrations of the lattice. The distribution function is represented as a series whose members are successive contractions of the spectrum. An emission spectrum of an impurity in a CdS crystal is considered. The calculation was performed with a BESM-2 computer for several experimentally obtain-

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UDC: 535.370

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L 14205-66 2

ACC NR: AP6003611

ed spectra taken at 4.2°K. The results showed a strong interaction with long-wave acoustic vibrations. In conclusion, the authors thank M. I. Petrashen' and I. V. Abarenkov for a number of useful suggestions. Orig. art. has: 1 figure, 22 formulas.

SUB CODE: 20/ SUBM DATE: 05Apr65/ ORIG REF: 005/ OTH REF: 004

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Card 2/2

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

L 42286-66

ACC NR: AP6022500 SOURCE CODE: UR/0054/66/000/001/0069/0074

AUTHOR: Trifonov, Ye. D.; Troshin, A. S.

ORG: none

TITLE: Phase operator for an oscillator

SOURCE: Leningrad. Universitet. Vestnik. Seriya fiziki i khimii, no. 1, 1966, 69-74

TOPIC TAGS: quantum oscillator, electromagnetic field, photon

ABSTRACT: It has been proposed in the literature that the electromagnetic field may be described in terms of the photon annihilation operator $\hat{a}_{\vec{k},\lambda}$. The operator for the positive-frequency portion of the electric voltage of the field can, with the aid of the operator $\hat{a}_{\vec{k},\lambda}$, be represented in the form

$$\hat{\vec{E}}^{+}(\vec{r}, t)=i\sum_{\vec{k},\lambda}\left(\frac{1}{2}L^{-3}\hbar\omega_{\vec{k}}\right)^{\frac{1}{2}}\vec{e}_{\lambda}(\vec{k})\,e^{i\vec{k}\vec{r}}e^{-i\omega_{\vec{k}}t}\hat{a}_{\vec{k},\lambda}, \qquad (1)$$

where L is one edge of the cube in which, according to the assumption, the field is enclosed; $\vec{k}$ is the wave vector; λ is the polarization

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UDC: 530.145.6

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

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index; $\vec{e}_\lambda(\vec{k})$ is the unit polarization vector. The true values of the operator $\vec{E}^+(\vec{r}, t)$ can be represented, respectively, by the formula

$$\vec{E}^+(\vec{r}, t) = i\sum_{\vec{k},\lambda}\left(\frac{1}{2}L^{-3}\hbar\omega_{\vec{k}}\right)^{\frac{1}{2}}\vec{e}_\lambda(\vec{k})\,e^{i\vec{k}\vec{r}}e^{-i\omega_{\vec{k}}t}a_{\vec{k},\lambda} \qquad (2)$$

where $a_{\vec{k},\lambda}$ is the true value of the operator $\hat{a}_{\vec{k},\lambda}$

$$\hat{a}_{\vec{k},\lambda}\left|a_{\vec{k},\lambda}\right\rangle = a_{\vec{k},\lambda}\left|a_{\vec{k},\lambda}\right\rangle \qquad (3)$$

The remainder of the article is given over to a mathematical development on the above basis. Orig. art. has: 34 formulas.

SUB CODE: 20/ SUBM DATE: 22Nov65/ ORIG REF: 007/ OTH REF: 013

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

124-57-1-565

Translation from: Referativnyy zhurnal, Mekhanika, 1957, Nr 1, p 71 (USSR)

AUTHOR: Trifonov, Ye. K.

TITLE: Calculation Method for an Intermittent Wave in River Beds (Metodika rascheta preryvnoy volny v rechnykh ruslakh)

PERIODICAL: Izv. Vses. n.-i. in-ta gidrotekhn., 1955, Vol 54, pp 54-64

ABSTRACT: The calculation of waves by means of the method of characteristics is described for the case when a river bed can be approximated by a number of rectilinear segments of varying width. Utilizing the well-known solutions for the propagation of waves in a straight-line canal, the author obtains a solution for his problem by obtaining consistency for the solutions on the junction lines of the individual segments. In order to obtain a closed system of equations relative to the flow parameters, the author employs supplementary discharge and energy equations at the junction lines between the segments. The paper contains numerous illustrative examples. Various practicable calculation procedures are shown for the case of an abrupt widening or narrowing of canals. N. N. Moiseyev

Card 1/1 1. Waves--Propagation 2. Waves--Characteristics 3. Inland waterways--Applications

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.K., inzh.

Methods for calculating points on characteristics on the boundary of two sections in u and λ coordinates by the method of Academician S.A. Khristianovich. Izv.VNIIG 48:222-230 '52. (MIRA 12:5)

(Hydrodynamics)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.K., kandidat tekhnicheskikh nauk.

Methods of calculating broken waves in river channels. Izv.VNIIG no.54:54-64 '55. (MLRA 10:3)
(Waves)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye. K.

"The Irregular Motion of Water in Open Channels With a Zero Initial Wave." Cand Tech Sci, Leningrad Polytechnic Inst imeni M. I. Kalinin, Min Higher Education USSR, Leningrad, 1955. (KL, No 14, Apr 55).

SO: Sum. No. 704, 2 Nov 55 - Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (16).

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TETERIN, P.K., kandidat tekhnicheskikh nauk; DANILOV, F.A., inzhener; TRIFONOV, Ye.S., inzhener.

Variations in pipe walls rolled on a three-high mill. Stal' 16 no.8: 721-727 Ag '56. (MLRA 9:10)

1.TSentral'nyy Nauchno-issledovatel'skiy institut chernoy metallurgii i Pervoural'skiy Novotrubnyy zavod.
(Rolling (Metalwork)) (Pipe, Steel)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.V., inzh.; YAMPOL'SKIY, S.L., inzh.

Selection of materials for shoes in stream-turbine thrust bearings. Energomashinostroenie 4 no.3:15-19 Mr '58. (MIRA 11:5)
(Bearings (Machinery))

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.V., inzh.; YAMPOL'SKIY, S.L., inzh.

Temperature conditions in steam-turbine thrust bearings and dependability of their performance. Elek.sta.29 no.3:23-27 Mr '58 (MIRA 11:5)
(Bearings (Machinery)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.V., kand.tekhn.nauk; YAMPOL'SKIY, S.L., inzh.; KHOMYAKOV, V.P., inzh.; SARAPOV, O.P., inzh.

Effect of certain structural parameters of a segmental sliding thrust bearing on its efficiency. Vest.mashinostr. 43 no.3:20-27 Mr '63. (MIRA 16:3)

(Bearings (Machinery))

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye. V.

PHASE I BOOK EXPLOITATION SOV/5055

Vsesoyuznaya konferentsiya po treniyu i iznosu v mashinakh. 3d, 1958.

Gidrodinamicheskaya teoriya smazki. Opory skol'zheniya. Smazka i smazochnyye materialy (Hydrodynamic Theory of Lubrication. Lubrication and Lubricant Materials) Moscow, Slip Bearings. 422 p. Errata slip inserted. 3,800 copies Izd-vo AN SSSR. printed. (Series: Its: Trudy, v. 3)

Sponsoring Agency: Akademiya nauk SSSR. Institut mashinovedeniya.
Resp. Eds. for the Section "Hydrodynamic Theory of Lubrication and Slip Bearings": Ye. M. Gutyar, Professor, Doctor of Technical Sciences; Ye. M. D'yachkov, Professor, Doctor of Technical Sciences, and A. K. D'yachkov, for the Section "Lubrication and Lubricant Materials": Resp. Ed. for the Section, Professor, Doctor of Chemical Sciences; Ed. of Publishing House: M. Ya. Klebanov; Tech. Ed.: O. M. Gus'kova.

PURPOSE: This collection of articles is intended for practicing engineers and research scientists.

COVERAGE: The collection, published by the Institut mashinovedeniya AN SSSR (Institute of Science of Machines, Academy of Sciences USSR) contains papers presented at the III Vsesoyuznaya konferentsiya po treniyu i iznosu v mashinakh (Third All-Union Conference on Friction and Wear in Machines) which was held April 9-15, 1958. Problems discussed were in

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Hydrodynamic Theory (Cont.)

Dritsker, Ye. V. Increase of the Load-Carrying Capacity of Thrust Bearings Operating at High Sliding Speeds	128
Tyabin, N. V. Rheodynamic Theory of Viscous-Plastic Lubrication	134
Khanovich, M. G. On the Problem of the Design of Sliding Thrust Bearings	146
Shklyar, L. A., and N. V. Tyabin. Outflow of Lubricant Through Labyrinth Seals	154

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Ivanov, I. F. New Approximate Method for Calculating Thrust Bearings (Published under the title: "Vertical-Axis Bearings for Hydrogenerators. Theory and Calculation") (Izd. Tsentral'nogo byuro tekhnicheskoy informatsii elektropromyshlennosti)	164
Kaplan, M. Ya. Thrust Bearing for Superpower Turbines (Vestn. mashinostroyeniya", No. 7, 1959)	164
Kleyman, L. I. Use of Segmented Bearings for Horizontal Electric Machines at the "Elektrosila" Plant imeni S. M. Kirov (Published at the "Elektrosila" Plant)	164
Kunin, I. A. Development of the Hydrodynamic Theory of Lubrication of Thrust Bearings (Published in 1957 under the title: "On the Hydrodynamic Theory of Lubrication of a Bearing" ("Izv. Vost. fil. AN SSSR", No. 4, 1957), and in 1959 under the title: "Two-Dimensional Problem of the Hydrodynamic Theory of Lubrication Taking Into Account the Dependence of the Viscosity on the Temperature" ("Izv. AN SSSR", No. 2, 1959)	164

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APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.V., inzhener; TSUKANOV, V.F., inzhener; YAMPOL'SKIY, S.L., inzhener.

Radial-thrust bearing for steam turbines placed with the oil pump. Energomashinostroenie 3 no.6:1-5 Je '57. (MIRA 10:7)
(Steam turbines)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV YE.V.

Trifonov Ye. V., "Experience in Adjustment of Hydro-dynamic Regulation Systems with a Centrifugal Pump, Working without a Head of Water on the Line of Suction," Vestnik mashinostroyeniya [Machine Herald] 1953, No 7, Pages 11-14.

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.V.

MOLOSHNYY, N.M., inzhener; TRIFONOV, Ye.V., inzhener; DUMOV, V.I., inzhener

New design of the PT-15-60u turbine feed pump made by the Kaluga Turbine Plant. Teploenergetika 2 no.9:58-61 S '55. (MLRA 8:10)

1. Kaluzhskiy turbinnyy zavod
(Centrifugal pumps) (Turbomachines)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.V.; DAVIDOVSKIY, O.N., redaktor; VORONIN, K.P., tekhnicheskiy redaktor

[Special problems in aligning reducer turbine equipment in electric power stations] Osobennosti tsentrovki reduktornykh turboagregatov elektrostantsii. Moskva, Gos. energ. izd-vo 1953. 82 p.
(Turbines) (MLRA 7:10)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.V., inzhener; YAMPOL'SKIY, S.L., inzhener.

Effect of oil pressure on the supporting capacity of steam turbine thrust bearings. Energomashinostroenie 3 no.1:8-11 Ja '57. (MLRA 10:3)

(Bearings (Machinery)) (Steam turbines)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.V., inzhener; YAMPOL'SKIY, S.L., inzhener.

Measuring axial forces in steam turbines. Elek.sta. 28 no.3:19-21 Mr '57. (MLRA 10:5)
(Steam turbines)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.V., inzh.; YAMPOL'SKIY, S.L., inzh.

Increase in the reliability of the axial bearings of steam turbines. Elek. sta. 31 no.9:27-30 S '60. (MIRA 14:10)
(Steam turbines)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.V.

104-3-6/45

AUTHOR: Trifonov, Ye.V. and Yampol'skiy, S.L., Engineers.

TITLE: The measurement of axial stresses in a steam turbine. (Izmereniye osevykh usiliy v parovoy turbine)

PERIODICAL: "Elektricheskiye Stantsii" (Power Stations), 1957, Vol.28, No.3, pp. 19 - 21 (U.S.S.R.)

ABSTRACT: Existing methods of measuring axial stresses in steam turbines suffer from a number of defects. Special spring supports are required in the thrust bearing if it is intended to use resistance strain gauges and so this method is mainly used for large turbine sets. The method of measuring the temperature on the bearing pads that is sometimes used is not always applicable as is demonstrated by experimental curves which show that the linear relationship between temperature and load which is usually adopted is only valid at a particular speed and over a narrow load range.

Accordingly a method was developed to measure the axial stresses in steam turbines from the pressure of the oil film in the thrust bearing. The relationship between the maximum pressure in the oil film and the thrust on the pad was calculated. It is in practice convenient to measure the pressure in the so-called "centre of pressure" of the pad. A theoretical basis for this method is given. Tests were made on two

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The measurement of axial stresses in a steam turbine. (Cont.)

kinds of pad. Small holes were made in the face of the pad and led to manometers through copper tubes which are sufficiently flexible to permit movement of the pad. Ordinary manometers can be used as great accuracy is not required. The results of the tests are shown in the form of a graph and show some divergence from values calculated from existing theories. Measurements made in this way may be used for other purposes such as for checking the operation of compensating devices of thrust bearings which should ensure even distribution of the load between the pads and an example of this kind is given.

The comparative simplicity of the measurements and the universality of this method for all designs of thrust bearings make it possible to use it for investigation of the operation of thrust bearings in operating conditions and for the adjustment of steam turbines in cases when the strain gauge method cannot be used for one reason or another.

There is an editorial note that until further experience has been acquired the method can only be recommended for turbines of less than 25 MW. There are 5 figures and 2 Slavic references.

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye.V., inzhener.

Setting up a hydromechanical regulating system with a centrifugal pump working without suction line blocking. Vest.mash. 33 no.7:11-14 Jl '53. (MLRA 6:8)

(Centrifugal pumps)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

AUTHORS: Trifonov, Ye.V., [illegible] Engineers
Khomyakov, V.P., Sarapov, [illegible] Engineers

TITLE: The effect of some design parameters of segmental slide thrust bearings on their efficiency

PERIODICAL: Vestnik mashinostroyeniya, no. 3, 1963, 20 - 2[illegible]

[illegible]

Card 1/2

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

S/122/63/000/003/004/000
A004/A126

The effect of some design parameters of ....

...eads on the functioning of the turbine ... material, ...
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...earings. The author ... ...
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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Ye. V.

Osobennosti tsentrovki reduktornykh turboagregatov elektrostantsiy (Alignment features of the reducer turbo-unit of power plants) Moskva, Gosenergoizdat, 195?.
82 p. Diagrs., Tables.

SO: M/5
667
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APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

L 40853-66 EWT(m)/T/EWP(t)/ETI IJP(c) DJ/WW/JD

ACC NR: AP6021719 (N) SOURCE CODE: UR/0229/66/000/005/0025/0030

AUTHOR: Trifonov, Ye. V.; Yampol'skiy, I. D.; Piruyev, Ye. V.; Ekzemplyarskiy, V. Ya.

ORG: None

TITLE: Water-lubricated plain bearings for high-speed turbine units

SOURCE: Sudostroyeniye, no. 5, 1966, 25-30

TOPIC TAGS: hydrostatic bearing, hydrodynamic bearing, bearing material, bearing stability, bronze, corrosion resistance, cavitation, water, turbine

ABSTRACT: The authors discuss difficulties associated with the use of water-lubricated bearings in high-speed turbine units. Some of these difficulties are the low viscosity of water as compared to turbine lubricants and the difficulties of machining materials suitable for operation under conditions of high temperature and pressure. The main difficulty however is the viscosity of water which produces a very thin lubricating layer. The thickness of the layer permits additional friction by particles suspended in the water. The authors propose the use of hydrostatic bearings which ensure a sufficiently thick lubricating layer independent of lubricant viscosity. Such bearings are widely used in chemical machine building. These bearings are based on the desired principles, but still have many disadvantages. Therefore bearings were developed and tested which are called "combination bearings" incorporating both hydrostatic and

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hydrodynamic principles. Laboratory test data are given together with verification of these data under operational conditions. The bearing material is the main factor in determining optimum bearing construction. Bearing materials have to satisfy the following requirements: 1. they must be highly resistant to corrosion and cavitation; 2. they must be resistant to scratches and must have good run-in characteristics at both high and low speeds; 3. they must have good wear resistance under conditions of semi-fluid friction, and in particular must be wear-resistant with respect to abrasive particles in water. As a result of several years of operational experience, OF-10-1 bronze was chosen for the bearings. This material has certain disadvantages such as comparatively low run-in properties and a high coefficient of expansion. All bearing designs considered in this article are made of this material. Four different types of combination bearings are tested. A diagram is given showing the temperature for the internal surface of the bearing inserts. Tests show that local heating of bearings is the main source of failure. Local thermal deformations affect the inserts and reduce cooling for the heated zone. The continuation of this process causes binding between shaft and bearing. Three of the four types of bearing designs tested suffer from these defects, while the fourth type (see figure) does not. This bearing is designed so that expansion due to heat both under normal and under emergency operating conditions does not reduce the clearance between shaft and bearing. The bearing inserts have a complex shape and are made so that the support surface is composed of four flexible elements. They are threaded in place, and in the event that fluid pressure falls, the shaft rests on the two lower lobes. Under these conditions, a wedge-shaped

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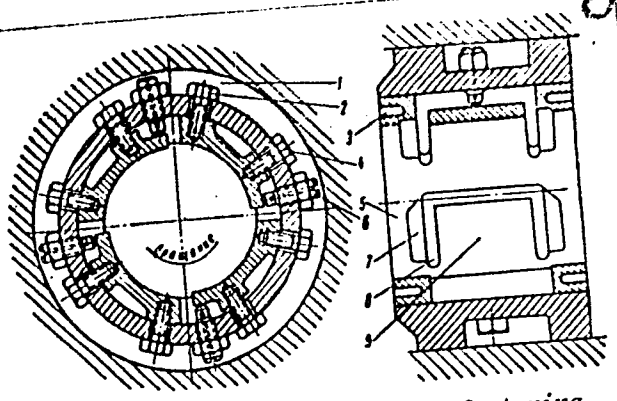
ACC NR: AP6021719

clearance is formed between the shaft and the section in which a hydrodynamic lifting force is set up. This enables the shaft to withstand emergency conditions of short duration. Thus the results of the study show that it is possible to develop a reliable water-lubricated bearing for high-speed turbine installations. The main problems for these conditions are ensuring the operation of the bearing under conditions of interrupted lubrication, and sufficient vibration resistance at high rpm. Of all types of bearing designs studied, the four-section lobe type is best suited for operation under conditions of water-lubrication in high-speed rotors. Orig. art. has: 6 figures, 1 table.



1--lubricant flow channel; 2--fastening bolt; 3--expansion groove; 4--strain pin; 5--band; 6--regulating bolt; 7--0.5 mm depression; 8--groove; 9--slip surface

SUB CODE: 13/ SUBM DATE: none/ ORIG REF: 007/ OTH REF: 000

Card 3/3 MLP

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Yuriy

Memorable meeting. Zdorov'e 8 no.5:26 My '62. (MIRA 15:5)
(REVOLUTIONISTS--CORRESPONDENCE, REMINISCENCES, ETC.)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Yu.A.; BYZOV, A.L.

Action of a constant current on the electroretinogram of the frog.
Biofizika 7 no.4:426-432 '62. (MIRA 15:11)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.
(ELECTRORETINOGRAPHY)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Yu.A.; BYZOV, A.L.

Reaction of cells, the sources of S-potentials of the turtle retina, to the current conducted through the eye goblet. Biofizika 10 no.4:673-680 '65. (MIRA 18.8)

1. Institut problem peredachi informatsii AN SSSR, Moskva.

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Yu.G.; GRIGOROV, V.B.

Elimination of helminthiasis in school children. Zdrav.Belor. 3 no.10:61-62 O '57. (MIRA 13:6)
(WORMS, INTESTINAL AND PARASITIC)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001756610020-3

TRIFONOV, Yu.M.

Approximate theory of steady-state conditions in a multiresonant magnetron. Vest. Mosk.un.Ser.3:Fiz,astron. 17 no.4:45-54 Jl-Ag '62. (MIRA 15:9)

1. Kafedra teorii kolebaniy Moskovskogo universiteta.
(Magnetrons)

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TRIFONOV, Yu.M.

Factorization of a characteristic equation of the third degree. Izv.TPI 137:93-98 '65.

(MIRA 19:1)

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TRIFONOV, Yu.M.

Synchronization of an ultrahigh-frequency oscillator operating toward a transmission line containing reflecting inhomogeneities. Vest. Mosk. un. Ser. 3: Fiz., astron. 18 no.3:26-31 My-Je '63. (MIRA 16:10)

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TRIFONOV, Yu.M.

Approximate solution of a problem on steady state conditions in a multicavity magnetron. Radiotekh. i elektron. 10 no.8:1453-1460 Ag '65. (MIRA 18:8)

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ACCESSION NR: AP3001769 S/0186/63/000/003/0026/0031

AUTHOR: Trifonov, Yu. M.

TITLE: Synchronization of an shf oscillator with a transmission channel containing reflected irregularities

SOURCE: Moscow. Universitet. Vestnik. Seriya 3. Fizika, astronomiya, no. 3, 1963, 26-31

TOPIC TAGS: uhf oscillators, synchronization, mismatched lines, magnetrons

ABSTRACT: The dependence of the synchronization band of an shf oscillator on the phase and modulus of the reflection coefficient in the presence of nonresonant irregularities in the transmission line was investigated. The oscillatory system was considered on the basis of an equivalent circuit with lumped constants and a mismatched waveguide containing a reflecting element. The coupling between the oscillator circuit and the waveguide was considered to be inductive. The synchronization bandwidth Delta f was found to depend mainly on the value of reflection coefficient phase angle Phi. The largest synchronization band can be obtained at Psi = (2n + 1) Pi, where n = 0, 1, 2, ...; the smallest band is at Psi = 2n Pi. Experiments carried out with 725A and 2G41 magnetrons

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showed that the smallest synchronization band corresponds to the values located in the center of the magnetron stable operation region and the largest, to those located in the center of the unstable region. The introduction of nonresonant irregularities into a transmission line results in a decrease by a factor of m in oscillator circuit insertion Q (where m = (1 + Ko)/(1 - Ko), Ko being the voltage standing wave ratio) and an increase by the same factor of the synchronization bandwidth without essential loss of magnetron output power. "The author thanks I. I. Minakovaya for valuable advice and for reviewing the results of the work." Orig. art. has: [illegible] formulas and 4 figures.

ASSOCIATION: Kafedra teorii kolebaniy (Department of the Theory of Oscillations)

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AUTHOR: Trifonov, Yu. M.

TITLE: Approximate theory for settled operation of a multi-resonator magnetron

PERIODICAL: Moscow. Universitet. Vestnik. Seriya III. Fizika, astronomiya, no. 4, 1962, 45 - 54

TEXT: The total h.f. and constant currents to the anode are calculated as functions of the constant anode voltage boost, of the h.f. voltage, and of the magnetron geometry. The following formulas are recommended for use in studying the nonlinear properties of a magnetron: constant current:

$$I_0 = \frac{N(N-4)}{2,5} \frac{\varepsilon_0 h \Delta\Omega_{nn}}{B_1 r_a^2 \left(s_1^{-\frac{N}{2}+2} \ln s_1^{-1} + \frac{2}{N-4} - \frac{2}{N-4} s_1^{-\frac{N}{2}+2} \right)} \frac{\sin\frac{N}{2}\beta}{\frac{N}{2}\beta} \times \quad (20)$$

$$\times V \sin\frac{N}{2}\theta.$$

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Approximate theory for settled...

mismatch angle:

$$a\cos\frac{N}{2}\theta - b\sin\frac{N}{2}\theta + b\sin\frac{N}{2}\theta + d\sin^2\frac{N}{2}\theta - c = 0, \qquad (22)$$

$$a = \frac{N}{2\pi}\frac{V}{r_a}\frac{\sin\frac{N}{2}\beta}{\frac{N}{2}\beta},$$

$$b = B_m r_a - \frac{m}{e}\omega_c^2 r_a - \frac{1}{4}\frac{m}{e}\omega_n^2\frac{r_1^2}{r_a}\left(1 - \frac{r_k^4}{r_1^4}\right), \qquad (22),$$

$$c = \frac{\Pi_1 r_a}{\omega_n}\cdot\frac{\frac{N}{2}\beta}{\sin\frac{N}{2}\beta}\left[\frac{1}{N-2}\left(1 - S_c^2 - \frac{2}{N}\right) + \frac{2,5}{N(N-4)}\left(3_1^{-\frac{N}{2}+2} - 1\right)\right]\frac{I_a}{V}$$

$$d = \frac{N^2(N-2)}{8\pi^2 r_a^2 B_1}\left(\frac{\sin\frac{N}{2}\beta}{\frac{N}{2}\beta}\right)^2 V^2.$$

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Approximate theory for settled...

total current:

$$I = -I_{ak}\sin\omega t + I_{peak}\cos\omega t + I'_{peak}\cos\omega t, \qquad (24),$$

$$I_{ak} = \frac{4\pi f_0 I_0 B_1 r_a^2 \sin\frac{N}{4}l}{(N-2)V}\cdot\frac{\frac{N}{2}\beta}{\sin\frac{N}{2}\beta}\left(1-s_c^2-\frac{2}{N}\right)-\frac{1.6}{\pi}I_0\sin\frac{N}{4}l\cos\frac{N}{2}0, \qquad (25),$$

$$I_{peak} = \frac{4\pi f_0 I_0 B_1 r_a^2 \sin\frac{N}{4}l}{(N-2)V}\frac{\frac{N}{2}\beta}{\sin\frac{N}{2}\beta}\left(1-s_c^2-\frac{2}{N}\right)+\frac{1.6}{\pi}I_0\sin\frac{N}{4}l\sin\frac{N}{2}0, \qquad (26).$$

$$I'_{peak} = 4e_0 N f_0 h\frac{\sin\frac{N}{2}\beta}{\frac{N}{2}\beta}\sin\frac{N}{4}lV.$$

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Approximate theory for settled...

N - number of resonators, β - half angular width of gap, V - voltage amplitude in the gap, Φ_{oa} - constant anode potential, $\Delta\Phi_{oa}$ - boost over threshold potential, $B_1 = B(1 - 2\omega_c/\omega_4)$, B - magnetic field strength, ω_c - angular velocity of spatial harmonic, ω_4 - cyclotron frequency, h - height of anode block, l - angular width of one segment, f_o - resonance frequency of the magnetron oscillatory system, $s_c = r_c/r_a$, $s_1 = r_1/r_a$, r_a - anode radius, r_1 - radius of electron cloud corresponding to threshold potential, $r_c = r_k \sqrt{\omega_4/(\omega_4 - 2\omega_c)}$, r_k - cathode radius. These results are in good agreement with experimental data. There are 5 figures and 3 tables.

ASSOCIATION: Kafedra teorii kolebaniy (Department of the Theory of Oscillations)

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