Works on Approximate Analysis

Works on Approximate Analysis

SOV/2217

Yarysheva, I. M. Finite Difference Methods of Solving Goursat's Problem   342

Il'in, V. P. On "Embedding" Theorems
359

Faddeyev, D. K. On the Condition of Matrices
387

AVAILABLE: Library of Congress

Card 5/5

IK/mg
11-10-59

$IL.6500$

AUTHORS: Yermakov, S. M., Zolotukhin, V. G.

TITLE: Polynomial Approximations and the Monte-Carlo-Method

TEXT: The authors propose an improved Monte-Carlo method for calculating multiple integrals. The improvement is carried out by reducing the dispersion, whereby the mean quadratic error is reduced for its part.

Let D be the domain of the k-dimensional Euclidean space;

$f(Q) \in L_D^2$; $\varphi_0(Q)$, $\varphi_1(Q)$, ..., $\varphi_n(Q) \in L_D^2$, where

$$(1) \quad \int_D \varphi_i(Q) \varphi_j(Q) \, dQ = \begin{cases} 0 \text{ for } i \neq j & i = 0,1,2,...., n \\ 1 \text{ for } i = j & j = 0,1,2,...., n \end{cases} .$$

The linear combinations of the $\varphi_i(Q)$ form the subspace $L_{D,n+1}^2 \subset L_D^2$. If the determinant $W_{n+1}(Q_0, Q_1, ... Q_n) =$

Card 1/ 3

86022

$S/052/60/005/004/007/007$
$C\ 111/\ C\ 333$

Polynomial Approximations and the Monte-Carlo Method

$-$ det $\|\varphi_0(Q_i),\ \varphi_1(Q_i),\ \ldots,\ \varphi_n(Q_i)\|_0^n$ is different from 0, then it holds the approximation formula

$$(2)\quad \int_d f(Q)\,\varphi_0(Q)\,dQ \approx \frac{\det \|f(Q),\varphi_1(Q_i),\ldots,\varphi_n(Q_i)\|_0^n}{W_{n+1}(Q_0,\ Q_1,\ldots,\ Q_n)}\quad.$$

If $f(Q) \in L^2_{D,\,n+1}$, then the remaining term is equal to zero.

Theorem 1: If $Q_0,\ Q_1,\ldots,\ Q_n$ are random points of the k-dimensional Euclidean space, the probability density of which $F(Q_0,\ Q_1,\ldots,\ Q_n)$ is equal to $\frac{1}{(n+1)!}\ W^2_{n+1}\ (Q_0,\ Q_1,\ldots,\ Q_n)$, then the mathematical expectation of the random variables

$$\theta(Q_0,\ Q_1,\ \ldots,\ Q_n) = \frac{\det \|f(Q_i),\ \varphi_1(Q_i),\ \ldots,\varphi_n(Q_i)\|_0^n}{W_{n+1}(Q_0,\ldots,\ Q_n)}$$

Card 2/3

86022
S/052/60/005/004/007/007
C 111/ C 333

Polynomial Approximations and the Monte-Carlo Method

is equal to $\int_D f(Q) \varphi_0(Q) \, dQ$.

Theorem 2: The dispersion of the random magnitude $\theta(Q_0, Q_1, \ldots, Q_n)$ is

$$D^2 \theta(Q_0, \ldots, Q_n) = \int_D f^2(Q) \, dQ - \sum_{i=0}^{n} \alpha_i^2 \text{ , where}$$

$$\alpha_i = \int_D f(Q) \varphi_i(Q) \, dQ , \quad i = 0, 1, 2, \ldots, n \quad .$$

The application of the improved method based on these theorems is especially favorable, if the Fourier series of $f(Q)$ with respect to the system $\{\varphi_i\}$ converges quickly to $f(Q)$ in the mean.

The authors thank G. J. Marchuk and J. M. Sobol'.

There are 3 references: 1 Soviet, 1 English and 1 American.

SUBMITTED: July 14, 1959

Card 3/3

33002
S/641/61/000/000/029/033
B102/B138

26.2245

AUTHORS: Yermakov, S. M., Kolesov, V. Ye., Marchuk, G. I.

TITLE: A numerical method for solving the Schrödinger equation with a blurred potential

SOURCE: Krupchitskiy, P. A., ed. Neytronnaya fizika; sbornik statey. Moscow, 1961, 314.- 323

TEXT: If square-well potential or oscillator potential are assumed in shell-model calculations, the problems can be solved analytically. The results, however, will be in worse agreement with experiment than for blurred potentials. A method is described for calculating both the nuclear energy levels and the cross sections. The potential $V(r)$ can be any shape, and have a zero singularity. In scattering problems it may be complex. In the usual way the boundary-value problem

$$\frac{d^2u(r)}{dr^2} + B(r)u(r) = \varkappa^2 u(r),$$
$$u(0) = 0, \quad u(\infty) = 0 \quad \quad (1)$$

Card 1/6

A numerical method for solving...

33002
3/641/61/000/000/029/033
B102/B138

is assumed to have a non-vanishing solution, and

$$B(r) = -U(r) + \gamma \frac{\hbar^2}{4m^2c^2} \frac{1}{r} \frac{\partial U(r)}{\partial r} \sigma | -\frac{l(l+1)}{r^2} \Bigg\} \quad (2)$$

$$U(r) = \frac{2m}{\hbar^2} V(r), \quad \varkappa^2 = \frac{2m}{\hbar^2} |E|, \quad E < 0.$$

For $r \to \infty$, $B(r) \to 0$. For $r \to \infty$, the solution of Eq. (1) diminishes exponentially and at $r = H$, $\frac{du(r)}{dr} = -\varkappa u(H)$. So from (1) the system of

linear algebraic equations

$$(B_1 h^2 - 2 - \varkappa^2 h^2) u_1 + u_2 = 0;$$
$$u_{l-1} + (B_l h^2 - 2 - \varkappa^2 h^2) u_l + u_{l+1} = 0 \ (l = 2, 3 \dots, n-1); \Bigg\} \quad (4)$$
$$2u_{n-1} + (B_n h^2 - 2 - \varkappa^2 h^2 - 2\varkappa h) u_n = 0.$$

is obtained, where h = H/n. $\varkappa$ is chosen so that the determinant of this
system will vanish. ($D_n = 0$). D_n can be calculated with a recurrent

formula: $D_{i+1} = \theta_{n-i} D_i - D_{i-1}$ (i = 1,2...n-1)

Card 2/6

A numerical method for solving...

$D_0 = 2$, $D_1 = \theta_n - 2\kappa h$; $\theta_i = B_i h^2 - 2 - \kappa^2 h^2$ ($i = 1,2...n$). D_{n-j} is the sub-determinant when the first j rows and columns are deleted. The purely mathematical peculiarities of this method are discussed and, as an example, the greatest root of κ is calculated numerically for

$$B(r) = \begin{cases} 146.1717 - 2/r^2 & \text{for } r \leqslant 1 \\ - 2/r^2 & \text{for } r > 1. \end{cases}$$

This holds for a square-well potential and a nucleus with A~240 and l = 1. Then the method is applied for calculating neutron scattering cross sections.. The Schrödinger equation for the radial part of the neutron wave function is written as

$$\frac{d^2 u(r)}{dr^2} + \left[k^2 - \frac{l(l+1)}{r^2} \right] u(r) = U(r) u(r), \qquad (8)$$

$$U(r) = \frac{2m}{\hbar^2} V(r), \quad k^2 = \frac{2m}{\hbar^2} E, \, E > 0.$$

the potential V(r) may contain a spin-orbit term. For r = H, $|V(H)| < \varepsilon$, for $r \to \infty$, $V(r) \to 0$. With the conditions u(0) = 0 and

Card 3/6

A numerical method for solving...

33002
S/641/61/000/000/029/033
B102/B138

$$\left|\frac{du(r)}{dr}\right|_{r=H} = \lambda u(\text{H})$$ the problem is reduced to the boundary problem

$$\left.\begin{array}{l} (S_1 h^2 - 2)\,u_1 + u_2 = 0, \\ u_{i-1} + (S_i h^2 - 2)\,u_i + u_{i+1} = 0 \;\; (i = 2, 3, \ldots, n-1), \\ 2u_{n-1} + (S_n h^2 - 2 + 2h\lambda)\,u_n = 0. \end{array}\right\} \quad (11)$$

$$S(r) = R^{(1)} - \frac{l(l+1)}{r^2} - U(r).$$

and the determinant $\Delta_n = 0$ is found by using the above recurrent formula:

$\Delta_i = \omega_i \Delta_{i-1} - \Delta_{i-2}$ $(i = 2,3\ldots n-1)$; $\Delta_o = 1$, $\Delta_1 = \omega_1$,

$$\lambda = \frac{1}{2h}\left[2\frac{\Delta_{n-1}}{\Delta_{n-1}} - \omega_n\right]. \qquad (13)$$

If $V(r)$ is complex, $S(r) = S^{(1)}(r) + iS^{(2)}(r)$, $\lambda = \lambda_1 + i\lambda_2$, $\Delta = P + iQ$
and $\omega = p + iq$.

Card 4/6

A numerical method for solving...

33002

S/641/61/000/000/029/033
B102/B138

$$P_i = p_i P_{i-1} - P_{i-2} - q_i Q_{i-1},$$
$$Q_i = p_i Q_{i-1} - Q_{i-2} + q_i P_{i-1},$$
$$P_0 = 1, \quad P_1 = p_1, \quad Q_0 = 0, \quad Q_1 = q_1, \quad (18)$$

$$(17)$$

$$p_i = S_i^{(1)} h^2 - 2, \quad q_i = S_i^{(2)} h^2$$
$$(i = 2, 3, \ldots, n-1).$$

$$\lambda_1 = \frac{1}{2h} \left[2 \frac{P_{n-1} P_{n-2} + Q_{n-1} Q_{n-2}}{P_{n-1}^2 + Q_{n-1}^2} - p_n \right],$$
$$\lambda_2 = \frac{1}{2h} \left[2 \frac{P_{n-1} Q_{n-2} - Q_{n-1} P_{n-2}}{P_{n-1}^2 + Q_{n-1}^2} - q_n \right].$$

$$(19)$$

results. If $\Delta_0 = \omega_0$ and $\Delta_1 = \omega_0 \omega_1 - 2$, and the potential is real,

$$P_0 = p_0, \quad P_1 = p_0 p_1 - q_0 q_1 - 2,$$
$$Q_0 = q_0, \quad Q_1 = p_0 q_1 + q_0 p_1$$

$$(18a)$$

Card 5/6

A numerical method for solving...

if it is complex, $\omega_0 = S_0 h^2 - 2 - 2h\pi$, $p_0 = S_0^{(1)} h^2 - 2 - 2h\pi_1$, $q_0 = S_0^{(2)} h^2 - 2h\pi_2$, $\pi = \pi_1 + i\pi_2$. A numerical example is calculated for a Woods-Saxon potential and compared with experimental data. There are 4 figures, 3 tables, and 13 references: 6 Soviet and 7 non-Soviet. The four most recent references to English-language publications read as follows: D. J. Hughes, R. B. Schwartz, Neutron Cross Sections. B. N. L. N. Y. 1958; H. C. Bolton, H. I. Scoins. Proc. Camb. Phil. Soc. 52, 215 (1956); M. Walt, H. H. Barschall. Phys. Rev. 93, 1062 (1954); J. R. Beyster et al. Phys. Rev. 104, 1319 (1956).

Card 6/6

YERMAKOV, S.M.

Exact evaluation of the remainders of formulas of mechanical
cubage and multidimensional interpolation. Dokl.AN BSSR 6
no.2:73-76 F '62.   (MIRA 15:2)

1. Predstavleno akademikom AN BSSR V.I.Krylovym.
                    (Functional analysis)

YERMAKOV, S.M.; ZOLOTUKHIN, V.G.; PETROV, E.Ye.

Calculating the passage of neutrons through a plane polyethylene
layer. Atom. energ. 15 no.3:253-255 S '63.   (MIRA 16:10)

(Neutrons—Capture)   (Shielding (Radiation))

YERMAKOV, S.M. (Moskva)

Interpolation over random points. Zhur.vych.mat.i mat.fiz. 3
no.1:186-190 Ja-F '63.   (MIRA 16:2)
                    (Interpolation)   (Probabilities)

S/0000/63/000/000/0171/0181

ACCESSION NR: AT4019045

AUTHOR: Zolotukhin, V. G.; Yermakov, S. M.

TITLE: Application of the Monte Carlo method to the computation of nuclear radiation shielding

SOURCE: Voprosy fiziki zashchity reaktorov; sbornik statey (Problems in physics of reactor shielding; collection of articles). Moscow, Gosatomizdat, 1963, 171-181

TOPIC TAGS: nuclear reactor, reactor shielding, radiation shielding, Monte Carlo method, radiation transfer, scattering, neutron propagation, quadrature formula

ABSTRACT: The article contains a brief summary of the fundamental techniques for increasing the statistical efficiency of the Monte Carlo method with respect to problems of radiation transfer. The most important of the techniques discussed in the article have been proven on the basis of a large number of concrete problems. The author notes, by way of introduction, that considerable mathematical difficulties are encountered while solving the kinetic equation with consideration of the energy dependence of the cross sections, the anisotropy of the processes of scattering and the finite geometry. Because of this fact, in many cases the Monte Carlo method provides the only means of solving the problem.

Card 1/4

ACCESSION NR: AT4019045

The application of this method to problems involving the passage of neutrons and gamma quanta through a substance is possible due to the absence of any interrelation between the particles in real beams. The difficulties that arise in connection with the use of the Monte Carlo method are concerned primarily with the determination of small probabilities. In problems connected with the passage of radiation through a substance, the smallness of the probability p may be occasioned by the absorption of the particles, their leakage from the medium, energy losses as the result of slowing, etc. It is pointed out that the Neuman series for the solution of the kinetic equation reduces the radiation transfer problem to the computation of multiple intervals, while the Monte Carlo method itself consists essentially in the calculation of the terms of a Neuman series which are the multiple intervals. The use of non-random points, in the opinion of the authors, implies a repudiation of the probabilities of the Monte Carlo scheme, eliminating the possibility of a practical evaluation of the accuracy of the results. In those cases in which interest attaches to a particular functional of the kinetic equation solution, the methods which are described in this article for increasing the statistical effectiveness of the method normally provide an accuracy quite satisfactory for practical purposes with a number of histories ranging from

Card   2/4

ACCESSION NR: AT4019045

10^3 to 10^4. The authors describe the method of conditional probabilities (in American technical literature this method is known as the method of analytical averaging). It is noted that different modifications of this method are possible, all being based on the introduction of the transitional probability $K(x \rightarrow x)$, connected with $K(x \rightarrow x)$ by the formula

$$K'(x \rightarrow x') = \frac{K(x \rightarrow x')}{\int_{(D)} K(x \rightarrow x') dx'}, \qquad (1)$$

where (D) is the region of space T in which the function $\varphi(x)$ assumes the greatest values. The semi-analytical Monte Carlo method is briefly discussed. This method is based on the use of analytical solutions (provided such are possible) for certain ramifications of the basic straying process. The essential idea of the "control variable method" is explained. This technique is sometimes also called the "correlation sampling method". The point is made that the chief difficulty in the use of this method consists in finding random values $\xi_1, \ldots, \xi_n$, of high correlation with ξ_0, the mathematical expectancies of which are known. The method of local stream calculation is discussed and examples of its use are given. The use of quadrature formulas with random nodes is analyzed, and it is noted that the further development of the general methods for reducing the dispersion, based on the construction of interpolation-quadrature formulas, permits the formulation of

Card 3/4

ACCESSION NR: AT4019045

quadrature expressions with random nodes of high accuracy, which are very useful for practical applications. A final section of the article deals with problem-solving through the use of high-speed electronic computers. Orig. art. has: 19 formulas.

ASSOCIATION: none

SUBMITTED: 14Aug63   DATE ACQ: 27Feb64   ENCL: 00

SUB CODE: NP   NO REF SOV: 010   OTHER: 005

Card 4/4

MIKHAYLUS, F. F.; ZOLOTUKHIN, V. G.; YERMAKOV, S. M.

"Solution methods of transport equation in inhomogeneous and finite media."

report submitted for 3rd Intl Conf, Peaceful Uses of Atomic Energy, Geneva,
31 Aug-9 Sep 64.

(BR)

ACCESSION NR: AP4037259   8/0208/64/004/003/0550/0554

AUTHOR: Yermakov, S. M. (Moscow)

TITLE: Random quadratures of raised accuracy

SOURCE: Zhurnal vy*chislitel'noy matematiki i matematicheskoy fiziki, v. 4, no. 3, 1964, 550-554

TOPIC TAGS: random quadrature, Monte Carlo, spherical singularity, mechanical quadrature, random node, iteration quadrature formula, Gaussian quadrature, Fourier coefficient

ABSTRACT: The author studies quadrature formulas (with random nodes) of raised accuracy which are, in a sense, analogs of Gaussian quadratures. He computes the mean and the dispersion for the corresponding quadrature sum for inference on the size of the error of the constructed quadrature formulas. Orig. art. has: 8 formulas.

ASSOCIATION: none

SUBMITTED: 29Jun63   DATE ACQ: 09Jun64   ENCL: 00

SUB CODE: MA   NO REF SOV: 002   OTHER: 002,

Card 1/1

BUBLIK, Yu.I.; YERMAKOV, S.M.; YEFIMENKO, B.A.; ZOLOTUKHIN, V.G.; PETROV, E.In.

Gamma-ray dose from a unidirectional source near the soil-air interface.
Atom. energ. 18 no.6:628-629 Je '65.
(MIRA 18:7)

L 6469-66   EWT(m)/EPF(c)/ETC/EPF(n)-2/EWD(m)   WW/DM   UR/0019/65/019/001/0071/0073

ACCESSION NR: AP5019817   539.142:539.121.72

AUTHOR: Yermakov, S. M.; Petrov, E. Ye.

TITLE: Concerning the passage of γ quanta through shielding barriers

SOURCE: Atomnaya energiya, v. 19, no. 1, 1965, 71-73

TOPIC TAGS: reactor shielding, water, lead, Gamma radiation, Gamma scattering

ABSTRACT: The authors describe an effect connected with the passage of γ quanta through a flat shield consisting of two components, a primary layer of water and a secondary layer of lead. The effect consists in the fact that in the case when hard gammas are incident on the shield at large inclination to the normal direction, an increase in the thickness of the water may lead to an increase in the intensity of radiation transmitted through the shield. The reasons for the phenomenon are briefly explained. The effect was observed during the course of an analysis of Monte Carlo calculations of the passage of γ rays through multilayer shielding barriers, in which account was taken of Compton scattering and absorption due to the photoeffect and to pair production. The calculations were made for a multidirectional monoenergetic radiation source. The effect takes place at angles exceeding 82° and energies above 6 Mev. The variation of the radiation characteristic with the thickness of the water layer is briefly discussed. "The

Card 1/2

L 6469-66

ACCESSION NR: AP5019817

authors thank N. F. Kham'yanov for the electronic-computer calculations." Orig.
art. has: 5 figures.

ASSOCIATION: none

SUBMITTED: 13Aug64   ENCL: 00   SUB CODE: HP

NR REF SOV: 000   OTHER: 000

Card 2/2

L 5066-65   EWT(m)   DIAAP   DM

ACC NR: AP5022639   UR/0089/65/019/002/0179/0180

AUTHOR: Gromov, B. F.; Yermakov, S. M.; Kazarnikova, Ye. Ye.;
Bolodyankin, M. A.   26

                                                             B

TITLE: Angular and energy distribution of gamma radiation on the
surface of a volume source

SOURCE: Atomnaya energiya, v. 19, no. 2, 1965, 179-180

TOPIC TAGS: nuclear reactor, gamma radiation, nuclear physics apparatus

ABSTRACT: Many layers of material are usually placed in nuclear reac-
tors between the reactive core itself and the outside surface of the
shield. Therefore, various attenuation processes must be taken into
account in calculations of biological shielding. The authors investi-
gated the angular and energy distribution of gamma radiation on the out-
side surface of the reactor. The results of their research are given
for two cases. In one case, the reactor vessel was protected in water
by a boron shield while in the other case no boron shielding was
provided. The Monte Carlo method was used for calculations by means of
M-20 electronic computing machine. It was assumed, that the gamma rays
were generated at the initial energy levels of 2, 3, 4, 5, 6 and 7 Mev.

Card 1/2   UDC: 539.122:539.121.73:539.121.64

L 5066-66

ACC NR: AP5022639

The greatest statistical error after 12000 tests was less than 25% for angular and 20% for energy distributions. The distributions applied to two above mentioned cases and seven energy levels were illustrated by two sets of histograms. The attenuation of 7 Mev gamma radiations in lead shields was also analyzed. The results of this analysis expressed in dose rates were tabulated and graphically illustrated.

ASSOCIATION: None

SUBMITTED: 20Mar65   ENCL: 00   SUB CODE: NP

NO REF SOV: 000   OTHER: 000

Card 2/2

L 00065-66   EWT(m)/EPA(w)-2/EWA(m)-2   IJP(c)

ACCESSION NR: AP5021324   UR/0120/65/000/004/0026/0029
                                                        539.1.074

AUTHOR: Teplyakov, V. A.; Yermakov, S. M.; Makarov, A. I.; Gendel', Yu. G.;
Krasnovskiy, V. I.; Shembel', B. K.

TITLE: The use of accelerating field focusing in the beginning part of a linear
ion accelerator

SOURCE: Pribory i tekhnika eksperimenta, no. 4, 1965, 26-29

TOPIC TAGS: MEV accelerator, ion beam focusing, particle accelerator component

ABSTRACT: The beginning part of an accelerator (b.p.a.) is distinguished by large
relative velocity increments within the gaps of the accelerating system. The
existing theory of accelerating field focusing is applicable to accelerators with
small velocity increments only (1-2%) and describes only poorly the ion motion
with the b.p.a.. Such a focusing was tested only on electron models of 4—7 MEV
proton linear accelerators and the present authors tested the accelerating field
focusing in a b.p.a. with velocity increments of 5—15% and an injection energy
of 50 kEV with an operative wavelength of 5 m. This article describes the instru-
ment and by comparing the proton spectra at its exit (drift tubes with a channel

Card   1/2

L 00065-66

ACCESSION NR: AP5021324

having rectangular or circular cross section) shows that the focusing by means of the accelerating field is quite effective. "The authors thank A. P. Fedokov for his participation during the accelerator design, B. K. Kondrat'yev, R. P. Kuybide, and V. I. Moguchev for their part in putting the device into operation, and A. I. Trikin for his help in carrying out the experiments." Orig. art. has: 4 figures.

ASSOCIATION: None

SUBMITTED: 27May64   ENCL: 00   SUB CODE: NP

NO REF SOV: 003   OTHER: 000

Card   2/2

L 06993-67   EWT(m)/EWP(t)/ETI   IJP(c)   JD/WH/JG/JR
ACC NR: AP6021522   SOURCE CODE: UR/0089/66/020/006/0469/0473

AUTHOR: Goryachev, I. V.; Dulin, V. A.; Yermakov, S. M.; Kolyshenkova, V. V.;
Suvorov, A. P.; Trykov, L. A.

ORG: none   19

TITLE: Angular distribution of fast neutrons behind iron shields /4

SOURCE: Atomnaya energiya, v. 20, no. 6, 1966, 469-473 /

TOPIC TAGS: neutron distribution, fast neutron, angular distribution, reactor
shielding, iron

ABSTRACT: The authors have measured the angular and energy distributions of fast
neutrons behind iron shields of 10 and 15 cm thickness. The results of the experi-
ment are compared with calculations by the Monte Carlo method and with many-group
calculations by the "transmission" matrix method in the $2P_7$ approximation. The
results of the calculations show that the transmission of the shield depends
strongly on the angular distribution of the incident radiation. The transmission
measurements were made using an RIZ uranium-water reactor with a stainless steel
reflector. The agreement of the experimental and the calculated data are found to

Card 1/2   UDC: 539.125.52

L 06993-67
ACC NR: AP6021522   /

be satisfactory both in absolute magnitude and in the form of the angular distribu-
tions. A study was also made of the difference in character of the spatial and
angular distributions of fast neutrons from a point source in an infinite homo-
geneous medium and from a point source located at a plane barrier. The results
show that the allowance for the thickness of the shield leads to a steeper fall off
in the neutron flux than in the case of an infinite medium. Other differences be-
tween infinite and finite shields are also pointed out. The authors thank Yu. A.
Kazanskiy for valuable advice and discussions. Orig. art. has: 5 figures and 1
formula.

SUB CODE: 18   SUBM DATE: 04Sep65/   ORIG REF: 013/   OTH REF: 004

Card 2/2 ℒℂ

L 05049-67   E/T(m)   JR/GD

ACC NR: AT6027921   SOURCE CODE: UR/0000/66/000/000/0067/0071

AUTHOR: Yermakov, S. M.; Prokof'yeva, Z. A.

ORG: None

TITLE: Use of the Monte Carlo method in shielding calculations

SOURCE: Voprosy fiziki zashchity reaktorov (Problems in physics of reactor shielding); sbornik statey, no. 2. Moscow, Atomizdat, 1966, 67-71

TOPIC TAGS: Monte Carlo method, radiation shielding, computer programming

ABSTRACT: The authors consider some procedural problems associated with the compila-
tion of programs for solving problems in nuclear radiation shielding by the Monte
Carlo method. There are two classical approaches in using this method for calculating
the passage of radiation through matter: 1. modeling the behavior of a neutron or γ-
quantum in the medium and 2. writing out the solution for the integral equation of ra-
diation transfer in the form of an infinite series with terms which are multiple inte-
grals of increasingly higher order (Neumann series) with subsequent application of the
Monte Carlo method for calculating these terms. Two problems are considered: the gen-
eral structure of a program for shielding calculation and the structure of an elemen-
tary unit for general shielding geometry. It is assumed in the discussion that the
reader is familiar with the Monte Carlo method as presented in works by Buslenko,

Card 1/2

L 05049-67

ACC NR: AT6027921   0

Zolotukhin, Vladimirov and others where it is shown that penetration of radiation
through matter may be given in terms of the phase coordinates of the particles along
its trajectory. A procedure is described for compiling a program to follow this tra-
jectory. Particular emphasis is given to that part of the program for determining the
distances travelled by the particle in moving from a given point in a given direction
before exit from the medium. An algorithm in ALGOL-60 language is given in the form of
a procedure for determining these distances and correlating the corresponding numbers.
The resulting geometric unit may be useful in other computational methods, e. g. for
constructing three-dimensional nets for difference methods. Orig. art. has: 1 formu-
la.

SUB CODE: 12, 09/ SUBM DATE: 12Jan66/ ORIG REF: 003

Card 2/2

C. YERMAKOV, Sh.N.

116

Chair of Faculty
Therapy

Influence of ascorbic acid, nicotinic acid, and vitamin B₁ on extrasecretory function of pancreas (especially in ailments of the liver and bile passages). Sh. N. Yermakov (Naval Med. Acad., U.S.S.R.). *Terapevt. Arkh.* 17, No. 1, 68-9(1945).—Administration of 500 mg. ascorbic acid intravenously stimulated the extra-secretory pancreatic function within 30 min., increasing trypsin, amylase and lipase. Nicotinic acid (100-150 mg.) gave less pronounced effect and trypsin and amylase usually declined to near normal levels within 1.5 hrs. Vitamin B₁ had no stimulating effect and large amts. sometimes led to decreased pancreatic function. O. M. Kandapod

YERMAKOV, S.P.

The "Bolshiye Voronki" Cave in Pahiya. Zemlevedenie 4:67-80 '57.
(Pashiya—Caves)   (MIRA 10:9)

YERMAKOV, S. S.

YERMAKOV, S. S.   "Investigation of Steel for the Cutting Edges of
Drills." Min Higher Eucation USSR. Leningrad
Polytechnic Inst imeni M. I. Kalinin, Leningrad,
1956. (Dissertation for the Degree of Candidate
in Sciences)
Technical

So: Knizhaya Letopis', No. 17, 1956

YERMAKOV, S. S.

"An Investigation of the Geometry of a Cardan Suspension With the Aid of a Stereographic Projection," by S. S. Yermakov, Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, No 6, Jun 57, pp 58-63

The article introduces a graphical method of solving a series of problems which are encountered in an investigation of the geometry of a Cardan suspension. ·The method makes use of a stereographic projection and is based on the method of analysis employed by V. V. Dobrovol'skiy in his work, Teopiya Sfericheskikh Mekhanizmov, (The Theory of Spherical Mechanisms), Moscow, 1947.

The author first locates the stereographic image normal to the plane of a Cardan ring on a reference plane connected to a stationary base, then determines the angle of inclination of a second Cardan ring in relation to the stationary base; next he determines the angle between the swinging axes of the Cardan rings and the line of intersection of the plane of the second Cardan ring and the plane connected to the stationary base. Then he locates, on the reference plane connected to the stationary base, the stereographic image of a point in the plane of the second Cardan ring, and finally, determines the angles between the plane of the second Cardan ring and the plane connected to the stationary base, which are measured in various planes passing through the center of the suspension. (U)

Sum in 1467

YERMAKOV, S. S

24-6-10/24

AUTHOR: Yermakov, S. S. (Moscow).

TITLE: Analysis of the geometry of the gimbal suspension with the help of stereographic projection. (Rassmotreniye geometrii kardannogo podvesa pri pomoshchi stereograficheskoy proyektsii).

PERIODICAL: "Izvestiya Akademii Nauk, Otdeleniye Tekhnicheskikh Nauk" (Bulletin of the Ac.Sc., Technical Sciences Section), 1957, No.6, pp.58-63 (U.S.S.R.)

ABSTRACT: The problem of expressing the relations between the different angles defining the position of a gimbal mounting is considered. Previous work has used spherical trigonometry or Cartesian projections of a unit vector. The present paper uses the construction in a plane, with the help of stereographic projection, of geometric figures which are in mutually unique correlation with geometric figures given on a spherical surface. The plane coincides with that of one of the great circles. The methods used by Dobrovol'skiy, V.V. (The theory of spherical mechanisms, Mashgiz, Moscow, 1947) and the properties discovered by Fedorov, Ye. S. (A course in crystallography, Rikker, St. Petersberg, 1901) are the foundations of the present study. Geometric constructions by the drawing of lines and

Card 1/2

AUTHOR: Yermakov, S. S., Candidate of Technical Sciences. 129-7-10/16

TITLE: On the content of carbon in case hardening steels.
         (O soderzhanii ugleroda v tsementuyemykh stalyakh).

PERIODICAL: "Metallovedenie i Obrabotka Metallov" (Metallurgy and
         Metal Treatment), 1957, No.7, pp. 43-45 (U.S.S.R.)

ABSTRACT: Ipatov, N. K. (4) investigated the resistance to repeated
         impact of case hardened carbon steels containing 0.16 and
         0.23% C and arrived at the conclusion that an increase in
         the C content from 0.16 to 0.23% and an increase of the
         case hardening depth brings about an increase of the
         impact strength of steel and the higher the carbon content
         of the case hardened steel the more harmful is the effect
         of the case hardening. His conclusions may not be fully
         justified since his investigations were not long enough
         and amounted to only about 10 000 impact cycles and also
         he did not take into consideration the ratio of the area
         of the case hardened layer to the area of the entire cross
         section. To establish the optimum carbon content in
         case hardening steels 12 mm dia. 150 mm long specimens
         made of the Steels 10, 20, 35 and 45 were carburised for
         durations of 2 to 20 hours at 900 to 920 C in a solid
         carburising agent. The respective C contents were

Card 1/2

YERMAKOV, S.S.

AUTHOR: Vyaznikov, N.F., Yermakov, S.S.   32-9-20/43

TITLE: A Method of the Investigation of Fatigue by Impact in Steel
(Metodika issledovaniya stali na udarnuyu ustalost')

PERIODICAL: Zavodskaya Laboratorija, 1957, Vol. 23, Nr 9, pp 1095-1097 (USSR)

ABSTRACT: The authors developed a method for the determination of the in-
fluence exercised by the liquid medium upon the impact fatigue re-
sistance of steel and carried out a corresponding investigation. The
scheme of a machine and the experimental method are described. The
recorded curves for continuous impact strength of the case-hardened
samples are given in form of the dependence of a number of impacts
until destruction upon the energy of the single impact. It is shown
that the most resistant steel in the case-hardened state both in the
air and in the liquid medium is the steel 20 KhN3A. From a comparison
of the curves obtained when investigating in the solution and in the
air, it may be seen that in the case of all types of steel a decrease
of impact-fatigue-strength may be observed when investigation is
carried out in the solution. In the case of short investigations
(20-40 min.) in the liquid medium this decrease amounted to 38-42%,
in the case of tests of long duration (45-50 hours) it amounts to
53-55%. In order to determine the influence exercised by the compo-
sition of the solution on the decrease of the strength of steel,

Card 1/2

32-9-20/43

A Method of the Investigation of Fatigue by Impact in Steel

comparative impact-fatigue-tests were carried out with case-hardened samples of 12 KhN2A steel in pure distilled water, in the air, and in a solution. It is shown that the greatest decrease of impact strength was observed in the case of the test carried out in the solution. The investigation of the destroyed sample showed that the working surface of the sample had no oxide film as a result of a test carried out in distilled water, in contrast to the surface obtained by the investigation carried out in the solution. It is assumed that, besides the phenomena of the adsorption and strutting effect, the reduction of impact strength is caused also by the effect of corrosion. In the case of short experiments the effect of corrosion is of no importance, but with an increase of the duration of the experiment the role played by it increases steadily. The data obtained agree well with the tests carried out in nature with drilling milling cutters (the latter developed in a liquid medium under cyclical impact stresses). There are 3 figures, 1 table and 3 Slavic references.

AVAILABLE: Library of Congress

Card 2/2

SOV/137-58-10-21617

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 10, p 166 (USSR)

AUTHORS: Nekhendzi, Yu.A., Vyaznikov, N.F., Yermakov, S.S.

TITLE: New Types of Steel for Manufacture of Cutters of Drilling Bits and Methods of Their Investigation (Novyye stali dlya sharoshek burovykh dolot i metodika ikh issledovaniya)

PERIODICAL: Materialy Mezhvuz. nauchn. soveshchaniya po vopr. novoy tekhn. v neft. prom-sti, 1958, Vol 3, pp 111-127

ABSTRACT: Factors affecting the destruction of cutters of drilling bits (CDB) were investigated and a number of requirements which must be satisfied by steels of which the CDB are made were developed. Comparative impact-strength tests were performed on 11 different types of steel. It was established that the increase in impact strength, produced during surface hardening of the CDB by means of cementation, is decisively affected by the strength of the carburized layer (CL), rather than by the magnitude and nature of distribution of the residual and surface stresses. It is therefore essential that such alloying elements as Ni, Cu, etc., which tend to reduce brittleness and increase the strength and plasticity of the CL be introduced into

Card 1/2

SOV/137-58-10-21617

New Types of Steel for Manufacture of Cutters of Drilling Bits (cont.)

carburized steels employed for the manufacture of the CDB. The greatest increase in impact strength as a result of carburization is observed when the ratio of the depth of the CL to the radius of the specimen amounts to 0.18-0.22, and the ratio of the surface of the CL to the surface of the entire specimen amounts to 0.36-0.38. It is found that the following types of steels combine optimal mechanical properties with high impact strength: 1) 25Kh2GN2D2F steel containing 0.2-0.28% C, 0.3-0.4% Si, 0.8-1.1% Mn, 1.5-1.8% Cr, 1.8-2.2% Ni, 0.15-0.2% V, and 1.8-22% Cu; R_C, 44-37; σ_s, 158-141 kg/mm^2; σ_b, 169-152 kg/mm^2; ψ, 48.3-53.6%; δ, 7.95-10.1%; a_k, 7.6-13 kgm/cm^2; 2) 25Kh2GN2T steel containing 0.2-0.28% C, 0.3-0.4% Si, 0.8-1.1% Mn, 1.5-1.8% Cr, 1.8-2.2% Ni, 0.8-0.15% Ti; R_C, 44-38; σ_s, 150-138 kg/mm^2; σ_b, 163-152 kg/mm^2; ψ, 48.8-52.6%; δ, 8.8-9.9%; a_k, 7.3-9 kgm/cm^2; 3) 25KhNFR steel containing 0.2-0.28% C, 0.3-0.4% Si, 0.6-0.8% Mn, 0.9-1.2% Cr, 0.9-1.2% Ni, 0.15-0.2% V, 0.003-0.004% B; R_C, 39-32; σ_s, 147-134 kg/mm^2; σ_b, 156-145 kg/mm^2; ψ, 42.3-49.6%; δ, 7.5-8.7%; a_k, 8-9.38 kgm/cm^2.

1. Drills--Production   2. Cutting tools--Materials   3. Steel--Physical properties   I.B.

Card 2/2

AUTHORS: Vyaznikov, N. F., Yermakov, S. S.   SOV/163-58-3-39/49

TITLE: Residual Stresses in Steels at Chemical and Thermal Treatment
             (Ostatochnyye napryazheniya v stali pri khimiko-termicheskoy
             obrabotke)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958,
             Nr 3, pp 236 - 241 (USSR)

ABSTRACT: The influence exerted by the composition of the steel on
             the extent and the character of the distribution of
             the residual stresses in cementite samples was investigated,
             and the extent and the character of the distribution of
             the residual tension in the subsurface region and the
             structure of the cementite layer were determined. The
             investigations were carried out with the steel samples
             25Kh2GT and 25Kh2GN2T. To investigate the influence exerted
             by carbon on the extent and the distribution character
             of the residual stress carbon steels of the types 20, 30
             and 40 were cemented at depths of 1,5 - 1,6 mm. The
             cementation of the samples was carried out in the carbonizer
             at temperatures of 910-920° within 3-20 hours. Then the
Card 1/2   samples were again hardened in oil at 780-800°. From

Residual Stresses in Steels at Chemical and Thermal   SOV/163-58-3-39/49
Treatment

the investigations carried out may be seen that with
a cementation layer of a thickness of up to 1,6 mm
in all samples the residual tension decreases, which
is also the case when the carbon content of the steel
is increased. When the diameter of the samples increases
and the thickness of the layer of cementite remains
the same the extent of the surface compression stress
is increased. Until the optimum thickness of the cementite
layer is reached the change of the residual stress pro-
ceeds on the melting curve. With a thicker cementite
layer a removal of the residual tension is observed. Ther.
are 3 figures, 2 tables, and 6 references, all of which are
Soviet.

ASSOCIATION: Leningradskiy politekhnicheskiy institut (Leningrad Poly-
technical Institute)

SUBMITTED: October 1, 1957

Card 2/2

18(7),18(3)

AUTHORS: Nekhendzi, Yu. A., Vyaznikov, N. F.,   SOV/163-58-4-43/47
             Yermakov, S. S.

TITLE: New Compositions of Casehardening Steel (Novyye sostavy
             tsementuyemoy stali)

ABSTRACT: The present investigation was carried out at the laboratoriya
             termoobrabotki i liteynaya laboratoriya LPI (Laboratory for
             Heat Treatment and Foundry Work at the Leningrad polytechnical
             Institute). The results of an investigation of standard steels
             18KhGT and 25Kh2GT (formerly used for milling cutters), and
             those of four new casehardening steels (suggested by the authors)
             are given. The new steels are: 25Kh2GN2D2F , 25Kh2GN2T and
             25KhNFR. The method, the determination of critical points, the
             investigation of depth hardening capacity, the investigation of
             mechanical properties, the investigation of the steel for repeated
             impact, the investigation of the influence of hardening layer
             depth and steel composition on fatigue impact strength, the
             investigation of fatigue impact strength of steel in air and

Card 1/2

New Compositions of Casehardening Steel   SOV/163-58-4-43/47

in liquid medium is given. The investigation showed that the
introduction of nickel and copper into the casehardening steel
increases the fatigue impact strength of steel. The fatigue
impact strength of steel increases, on account of casehardening,
only to a certain depth of the hardening layer. The optimum
depth of the hardening layer is obtained at a ratio of 0.18-0.22
between depth of layer and radius. In the investigation of the
casehardened samples for fatigue impact strength in liquid
medium, the impact endurance limit of the steel decreases
strongly both in continuous tests (50-55 hours) and in
short-termed tests (30-40 minutes). The new types of steel
suggested here can be recommended for the production of parts
stressed by repeated impact. There are 4 figures, 2 tables, and
6 Soviet references.

ASSOCIATION: Leningradskiy politekhnicheskiy institut
              (Leningrad Polytechnic Institute)

SUBMITTED: October 1, 1957

Card 2/2

YERMAKOV, S.S., kand.tekhn.nauk

Dependence of steel resistance to shock on tempering temperature.
Izv. vys. ucheb. zav.; chern. met. no.7:157-162 Jl '58.

(MIRA 11:10)

1. Leningradskiy politekhnicheskiy institut.
     (Steel--Testing)   (Tempering)

SOV/129-58-9-14/16

AUTHOR: Yermakov, S. S., Candidate of Technical Science

TITLE: Book Review (Retsenziya)

PERIODICAL: Metallovedeniye i Obrabotka Metallov, 1958, Nr 9,
            pp 55-57 (USSR)

ABSTRACT: The book "Manufacture of Iron Powder" by G.V.Samsonov
            and S.Ya.Plotkina, Metallurgizdat, 1957 is reviewed by
            S. S. Yermakov

            1. Iron powders--Production

Card 1/1

AUTHORS: Yermakov, S. S., Yosipovich, Ye. M. (Moscow)   103-19-5-2/14

TITLE: A Method of Forming Transmission Functions of Sampled-
-Data Control Systems With Extrapolating Devices (Metodika
sostavleniya peredatochnykh funktsiy impul'snykh sistem
regulirovaniya, soderzhashchikh ekstrapoliruyushchiye
: stroystva)

PERIODICAL: Avtomatika i Telemekhanika, 1958, Vol. 19, Nr 5,
pp. 401-407 (USSR)

ABSTRACT: A method of forming the transmission functions of extra-
polating devices is given here. It permits to use the
existing theory of impulse control for an analysis and
synthesis of systems containing these devices. The extra-
polating devices serve for transforming the discreet data
into continuous (or continuous in places) ones. The follo-
wing is shown: 1) In the investigation of the dynamics
of the control system with an impulse element, connected
in series, with an infinitely small reciprocal of the pulse
duty factor (skvazhnost') $(\gamma \to 0)$ and an extrapolating de-
vice these terms can be replaced by an impulse element

Card 1/2

A Method of Forming Transmission Functions of
Sampled-Data Control Systems With Extrapolating Devices

which forms pulses of a rectangular shape and $\gamma = 1$, and
by the linear (continuous) part of the extrapolating de-
vice which is also connected in series. 2) The transmis-
sion function of the linear part of the extrapolating de-
vice can be found by the application of the usual (and not
discreet) Laplace transformation. This transmission function
only expresses the connection between the representation of
the input and the output quantity in the case of a certain
shape of the input action - in the case of a continuity of
the rectangular pulses with $\gamma = 1$. Therefore such a func-
tion can be called a conditional transmission function.
3) On the basis of the data given here it can be stated
that the method of the conditional transmission functions
(in the sense here mentioned) is applicable when the input
action represents a continuity of impulses of any previously
known shape.
There are 4 figures, 1 table and 4 references, all of which
are Soviet.

SUBMITTED: November 1, 1957
AVAILABLE: Library of Congress
Card 2/2

1. Mathematical computers--Operation   2. Mathematical computers--
Control

Leningrad. Politekhnicheskiy institut imeni M. I. Kalinina
Metallovedenye (Physical Metallurgy) Moscow, Mashgiz, 1959. 107 p.
(Series: Its: Trudy, vyp. 202) 2,300 copies printed.

Sponsoring Agency: Ministerstvo vysshego obrazovaniya SSSR.

Resp. Ed.: V. S. Sadikov, Doctor of Technical Sciences, Professor;
M.: G. A. Kashchenko, Professor; Tech. Ed.: L. V. Shchetinina.
Managing Ed. for Literature on the Design and Operation of Ma-
chinery (Leningrad Division, Mashgiz): F. I. Petrov, Engineer.

PURPOSE: This collection of articles is intended for engineers,
metallurgists, and research workers in the field of physical
metallurgy and the heat treatment of metals.

COVERAGE: The papers in this collection contain the results of
experimental work dealing with the study of constitution diagrams
of metallic systems, the nature of solid solutions, aging of complex
alloys, processes occurring during the heating and cooling of alloys,
the mechanical treatment of steel.

Card 1/8

Synkov, V. S., and M. M. Solomina. Carburizing, 87
Results are given for carburizing, quenching, and tempering.
The results of a determination of the hardness and chemical
stability of the case are given.

Dymnikov, R. F., S.S. Yermakov, and A. A. Popandopulo. Cracks 91
in the Gas Cutting of Steel
Results are given of a metallographic investigation of the
causes of crack formation in the cut zone of case-hardened alloy
steel cut with an oxyacetylene flame. Methods of controlling
this problem are presented.

Dymnikov, R. F., and S.S. Yermakov. Investigation of Steel for 93
Twist Drill Bits
Data are given on the testing of three types of case-hardened
steel under conditions approximating those under which drill-
bits made of these steels operate. A method of heat treating
these bits is outlined.

Kashchenko, G. A. Decomposition of Residual Austenite During the 99
Tempering of Carbon Steel
This article and the one following give the results of an in-
vestigation of the dependence of magnetic saturation on temper-
ing temperature in the case of carbon steels having a carbon
content of 0.2 to 1.7 percent. It can be concluded from an
analysis of the curves that the decomposition of residual austenite
is independent of the carbon content and begins at 100°C.

Kashchenko, G. A., and N. V. Rombiev-yevskaya. Investigation of the 102
Tempering of Steels by the Magnetic Method

[...] mechanical properties of three spring alloys, the-phosphorus,
beryllium-bronze, and German silver. The elastic limit and
elastic aftereffect, little-studied characteristics, are assumed
to be of basic importance. It is shown that heat treatment is
decisively helpful in improving the alloys with respect to these
properties.

Card 7/8

SOV/129-59-2-7/16

AUTHOR;.   Yermakov, S.S., Candidate of Technical Sciences

TITLE: Impact Fatigue Strength of the Steel 30KhGS (Udarnaya
vynoslivost' stali 30KhGS)

PERIODICAL: Metallovedeniye i Termicheskaya Obrabotka Metallov,
1959, Nr 2, pp 34 - 36 (USSR)

ABSTRACT: The author investigated the influence of the tempering
temperature on the impact fatigue strength of 30KhGS steel
(0.32% C, 1.16% Mn, 1.20% Cr and 0.99% Si). The impact
fatigue/was tested on a machine, a sketch of which is
shown in Figure 1, in which a specimen with dimensions
as shown in Figure 2 was subjected to pure impact bending
(the load was applied simultaneously at two points with
impact energies of 25 and 60 kgcm) with a frequency of
600 impacts/min. After each impact, the specimen was
turned by 15°. Preliminary treatment of the specimens:
After machining, the specimens were quenched in oil from
880 °C, tempered in oil for 2 hours at 100, 200, 300, 400,
500, 600, 700 °C and, following that, cooled in air.
Three of the specimens were not tempered after hardening
and a further three were annealed at 880 °C for 2 hours.
Card1/3 Comparative fracture tests were made on a "Gagarin" press

Impact Fatigue Strength of the Steel 30KhGS

and the impact strength was determined by means of a
pendulum impact-testing machine with an impact energy
of 30 kgm. The obtained results, graphed in Figure 3,
show that all the mechanical properties, i.e. strength,
impact strength, and impact fatigue strength increase
in the case of tempering at 200 °C. For tempering
temperatures above 200 °C, the strength and yield point
values drop. The impact strength drops sharply at tempering
temperatures from 200 to 500 °C. However, for a tempering
temperature of 500 °C, there is an increase in the
impact strength. In contrast to this, the impact fatigue
strength shows a second maximum at 400 °C when the impact
strength is lowest and at 500 °C the impact fatigue
strength drops sharply. In the case of impacts of
60 kgcm specimens tempered at 400 °C withstand the largest
number of impacts, whilst in the case of impacts with
energies of 25 kgcm, the specimens tempered at 200 °C
withstand the largest number of impacts. It was found
that for this steel, the fatigue strength in the case of
Card2/3 repeated impact loading has features which are not revealed
in static tests or in   single-impact bending tests.

Impact Fatigue/Strength of the Steel 30KhGS   SOV/129-59-2-7/16

The fatigue curve for repeated impact loads, as a function of the tempering temperature, shows two maxima at 200 and 400 $^\circ$C, respectively. The magnitudes of these maxima are determined by the energies of the individual impact. There are 3 figures and 4 references, 3 of which are Soviet and 1 German.

ASSOCIATION: Leningradskiy politekhnicheskiy institut (Leningrad Polytechnical Institute)

Card 3/3

SOV/129-59-6-9/15

AUTHORS: Vyaznikov, N.F., Yermakov, S.S., Candidates of
            Technical Sciences

TITLE: Residual Stresses in the Hardened and the Case-hardened
            Layer (Ostatochnyye napryazheniya v zakalennom tsemento-
            vannom sloye)

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1959,
            Nr 6, pp 41 - 45 (USSR)

ABSTRACT: The aim of the work described in this paper was to establish
            the influence of the steel composition and also of the depth
            and the structure of the carburized layer on the magnitude and
            the character of the distribution of the residual stresses in
            carburized components. The influence of alloying elements and
            of the carbon contents on the residual stresses in carburized
            and heat-treated specimens was investigated on alloy and carbon
            steels with compositions as given in the table on p 42. Cyl-
            indrical specimens of 12 mm dia, 150 mm length, were investi-
            gated after being carburized in a mixture of 85% charcoal, 10%
            sodium carbonate and 5% barium carbonate at 910-920 °C for
            durations of 3-20 hours. Immediately after removal from the
            carburization boxes, the specimens were quenched in oil and
            quenched for a second time in oil from 780-800 °C. Following
Card1/4   that, the specimens were tempered for 1 hour at 200 °C and

SOV/129-59-6-9/15

Residual Stresses in the Hardened and the Case-hardened Layer

cooled in air. For one of the steels the specimens were sub-
jected to intermediate tempering at 660-680 °C for a duration of
4 hours prior to the second quenching. On the basis of the
obtained results, the following conclusions are arrived at.
1) The magnitude of the residual stresses and the character of
their distribution along the cross-section of the quenched,
carburized specimen depends on the depth of the carburized
layer, as well as on the chemical composition of the steel.
2) On increasing the depth of the carburised layer from
0.6-2.2 mm, the magnitude of the residual surface stresses
changes greatly. In the case of relatively shallow carburiz-
ation depths, there are compression stresses at the surface of
the specimens which increase with increasing depth of carburiz-
ation up to carburization depths of 1.2 mm. Further increase
of the carburization depth leads to a reduction in the compres-
sion stresses and in the case of carburization depths exceeding
2 mm, residual tensile stresses will be present at the
specimen surfaces.

Card2/4

SOV/129-59-6-9/15
Residual Stresses in the Hardened and the Case-hardened Layer

3) In accordance with the changes in the residual surface stresses, there will also be changes in the magnitude and the character of the stresses along the cross-section of the carburized specimens. If the depth of carburization does not exceed 1.2 mm, there will be a continuous change in the residual stresses along the cross-section. However, if the carburization depth exceeds 2 mm, the curve representing the distribution of the residual stresses will show a discontinuity in the compression stresses.
4) The magnitude and the character of the residual stresses are greatly dependent on the presence in the structure of a hardened layer of excess carbides and of residual austenite.

Card 3/4

SOV/129-59-6-9/15

Residual Stresses in the Hardened and the Case-hardened Layer

There are 2 figures, 1 table and 3 Soviet references.

ASSOCIATION: Leningradskiy politekhnicheskiy institut
        (Leningrad Polytechnical Institute)

Card 4/4

SOV/32-25-3-30/62

25(6)
AUTHOR: Yermakov, S. S.

TITLE: Methods of Investigating Steel With Respect to Abrasion Under
            Alternating Shock-like Loads (Metodika issledovaniya stali na
            abrazivnyy iznos pri udarnoperemennykh nagruzkakh)

PERIODICAL: Zavodskaya Laboratoriya, 1959, Vol 25, Nr 3, pp 337-339 (USSR)

ABSTRACT: Methods have been worked out by which data on abrasion under
            alternating shock-like loads as a function of composition and
            structure of the abrasion layer can be obtained. Data for the
            steel types 20KhN2A, 20KhN3A, and 20N3MA (Table) were obtained
            by these methods. In principle, the test unit (Fig 1) is a
            spring which causes the loading. An electric motor rotates a
            shaft (700 rpm). Samples in the form of cog wheels (Fig 2) were
            tested; in this case the jolting effect (in addition to the ef-
            fect of friction caused by the rotation) was conveyed by the
            cogs. White electro-corundum (0.6-0.8 mm), corundum (3-5 mm),
            and quartz sand, in a liquid with a composition similar to sea
            water, were used as abrasion mixture. The samples were cemented
            into hard carburizing salt up to a layer thickness of 1.5-1.7 mm
            at 930 ± 10° and given a thermal aftertreatment of various

Card 1/2

Methods of Investigating Steel With Respect to Abrasion Under Alternating
Shock-like Loads

SOV/32-25-3-30/62

types. The results showed (Fig 3) that the thermal aftertreatment, i.e. the microstructure of the layer considerably influences the degree of abrasion. 20N3MA steel was investigated with regard to the influence of the load on the abrasion and it was found that an increase of abrasion (it is doubled) almost does not occur until the load has increased from 150 to 250 kg. The abrasion of the steels tested depends on the structure and hardness of the surface layer under stress. There are 3 figures, 1 table, and 2 Soviet references.

ASSOCIATION: Leningradskiy politekhnicheskiy institut im. M. I. Kalinina
(Leningrad Polytechnical Institute imeni M. I. Kalinin)

Card 2/2

YERMAKOV, JJ.

PHASE I BOOK EXPLOITATION   SOV/4024

Vyaznikov, Nikolay Filippovich, and Sergey Stepanovich Yermakov

Primeneniye izdeliy poroshkovoy metallurgii v promyshlennosti (Use of Powder-Metallurgy Products in Industry) Moscow, Mashgiz, 1960. 187 p. Errata slip inserted. 5,000 copies printed.

Reviewer: P.B. Mikhaylov-Mikheyev, Professor; Ed.: M.I. Koryukov, Docent, Candidate of Technical Sciences; Ed. of Publishing House: M.A. Chfas; Tech. Ed.: A.I. Kontorovich; Managing Ed. for Literature on Machinery Manufacturing (Leningrad Division, Mashgiz); Ye. P. Naumov, Engineer.

PURPOSE: This book is intended for technical personnel in machine and instrument manufacturing industries. It may also be useful to students at schools of higher technical education.

COVERAGE: The authors describe methods of producing powders from various ferrous and nonferrous metals and the manufacture of rare and refractory metals by powder metallurgy. The theory and methods of manufacturing powdered-metal products and the properties of such

Card 1/6

Use of Powder-Metallurgy Products in Industry   SOV/4024

products (friction and antifriction materials, carbides and heat-
resistant alloys, filters, magnets and other machine parts,etc.)
are presented. No personalities are mentioned. There are 83
references: 63 Soviet, 12 English, 7 German, and 1 Polish.

TABLE OF CONTENTS:

Card 2/6

18.7500

78124
SOV/129-60-3-3/18

AUTHORS: Vyaznikov, N. F., Yermakov, S. S., Soldatova, N. N.
            Candidates of Technical Sciences)

TITLE: Case Hardening of Chromium Stainless Steel

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov,
             1960, Nr 3, pp 11-13 (USSR)

ABSTRACT: This is a report concerning the determination of a
            method of case hardening of steels 1Kh13 and
            1Kh17, with the purpose of increasing the surface
            hardness of products made from them. Low-chromium
            stainless steel does not have a sufficient hardness
            in hardened state and therfore cannot be used for
            products subject to abrasion and compression wear,
            etc. The chemical composition of investigated steels
            is given in Table 1.

Card 1/4

Case Hardening of Chromium Stainless Steel   78124
                                                  SOV/129-60-3-3/16

Table 1.

DISTRIBUTION OF STEEL	CHEMICAL COMPOSITION OF STEEL				
	C	Si	Mn	Cr	Ni
1X13	0,12	0,75	0,86	13,3	0,20
1X17	0,10	0,80	0,90	18,0	0,80

Case hardening was done in a solid carburizing agent,
containing 85% of birch charcoal, 10% of sodium
carbonate, and 5% of barium carbonate. The 20 x 20
x 60 mm samples were packed in iron boxes, heated
for 12 hr at 900°, 950°, $1,000^\circ$, and $1,050^\circ$ C and
cooled in the air. The hardness of samples,
Card 2/4   quenched from $1,000^\circ$ C after case hardening for

Case Hardening of Chromium Stainless Steel   78124
SOV/129-60-3-3/16

4-12 hr at various depths of case hardened layer,
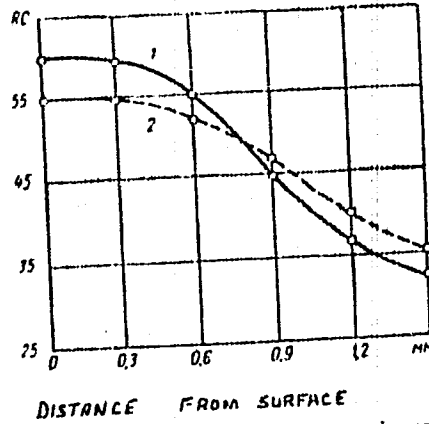is illustrated in Figure 1.

Fig. 1.   Hardness of samples, hardened from 1,000° C,
at various depths of case hardened layer: (1) steel
1Kh13; (2) steel 1Kh17.

Card 3/4

Case Hardening of Chromium Stainless Steel   78124
SOV/129-60-3-3/16

The conducted tests proved that the maximum hardness
of stainless steel (without case hardening) after
quenching from 1,000-1,500° C is not over 30 RC,
while after case hardening it increases to 55-60
RC. The steel which was case hardened at 950° C
differs very little (in hardness) from the steel
case hardened at 1,000° C. Therefore, the authors
recommend case hardening components made from
stainless steels 1Kh13 and 1Kh17 at 950° C and
quenching them from 1,000° C. There are 2 figures;
and 5 tables.

ASSOCIATION: Leningrad Polytechnic Institute imeni M. I. Kalinin
(Leningradskiy Politekhnicheskiy institut imeni
M. I. Kalinina)

Card 4/4

YERMAKOV, S.S.; PRODAN, N.S.

Methods of measuring impact energy in testing metals for impact
endurance. Zav. lab. 27 no. 12:1513-1514 '61.   (MIRA 15:1)

1. Leningradskiy politekhnicheskiy institut im. M.I. Kalinina.
(Metals—Testing)

S/810/62/000/000/012/013

AUTHOR: Yermakov, S.S.

TITLE: The wear and fatigue of steel under multiple shock loads while exposed
            to an abrasive liquid medium.

SOURCE: Metallovedeniye i termicheskaya obrabotka; materialy konferentsii po
            metallovedeniyu i termicheskoy obrabotke, soit. v 5. Odesse v 1960 g.
            Moscow, Metallurgizdat, 1962, 263-269.

TEXT: The paper describes a novel testing method and reports test results of
experimentation intended to investigate the problem of the rapid wear and failure
resulting from fatigue fissures in steel attributable to multiply repeated loads and
the action of an abrasive liquid medium on steels that ordinarily have elevated
resistance against abrasive wear, high strength, and good impact toughness. The
test equipment is shown in a schematic cross-section. In it a motor-driven rotat-
able vertical shaft is fitted at its lower end with a star-shaped assemble of 3 hori-
zontal idler shafts which serve as journals for spur-gear-shaped circular specimen
wheels. When the vertical shaft rotates, the gear-shaped specimen wheels roll in
a circular path over a cast-iron plate, and, owing to a downwardly exerted axial
spring load on the vertical shaft, the specimen wheels impose on their contact

Card 1/4

The wear and fatigue of steel under multiple ...

points with the cast-iron plate impact loads of predictable frequency and intensity. The impact-wear pair is contained in a circular bath filled with an abrasive liquid consisting of corundum and quartz sand. Inasmuch as the centrifugal force presses the gear-shaped specimens against their respective external retainer disks, and the interstice between them is also filled with the abrasive liquid, the experiment provides also information on the non-impact wear occurring in the abrasive liquid. Specimens made of steels 20XH2A (20KhN2A), 20XH3A (20KhN3A), and 20H3MA (20N3MA) were tested (mechanical properties are tabulated). Experiments for impact fatigue were performed by the pure-bending method of a rotating specimen supported as a simple beam and loaded with two spaced-apart concentrated normal loads; these tests were performed in air and in liquid corrosive media. The test equipment used is shown in cross-section. The specimens were subjected to cementation and heat treatment to increase their hardness and, hence, their abrasion resistance. Cementation was done in a solid carburizer at 930°C. Four different heat-treatment methods followed cementation: (1) Oil quench (OQ) after cementing, 2d OQ from 770°, and 2-hr temper at 180-200°; (2) 7-hr temper at 640°, intended to reduce the amount of retained austenite (RA) in the carburized layer, followed by Q and temper as in (1); (3) air cooling to 450-500° after cementation, then reheat to 830-850°, OQ, and 2-hr tempering 180-200°; (4) cooling in the carburizing box to 20°. Quench from 830-850° was performed to

Card 2/4

The wear and fatigue of steel under multiple ...   S/8/3/62/000/000/012/013

comminute the grain size and remove the carbide network; the lower-temperature
2d Q (720-740°) was intended to minimize the quantity of RA, whereupon the
specimens were tempered for 2 hrs at 180-200°. Procedures (1) and (4) yielded
a carburized-layer microstructure consisting of acicular martensite (M) with an
almost complete absence of RA; R_C 61-63. The other 2 methods did not eliminate
all of the RA, and their hardness was lower. Impact fatigue of steels: The
results of the determination of the impact-fatigue (IF) resistance (R) of specimens
cemented to a depth of 1.6-1.8 mm and heated-treated in one of the 4 above-
mentioned ways are tabulated. Steel 20N3MA, heat-treated according to method
(1), in which the carburized layer contained RA in the form of finely dispersed,
uniformly distributed inclusions, had the most favorable properties. Additional
tests showed that an increase from 720 to 780° of the second Q improved the
strength and plasticity of the carburized layer and the IFR of the specimen as well
by increasing slightly the quantity of RA. Yet higher second-Q temperatures
impaired the IFR of the steel by engendering appreciable growth of the M crystals.
In the same steel it was found that an increase in carburized-layer thickness up to
0.3 of the total cross-sectional area of the specimen improved the IFR of the
specimen, but a further increase in thickness reduces the IFR. The fatigue tests
in a corrosive liquid medium were performed in a solution similar in composition

Card 3/4

The wear and fatigue of steel under multiple ...   S/810/62/000/000/012/013

to sea water, and a reduction in IFR was observed not only during long-term
(40-50 min) tests, but in short-term (20-40 min) tests as well. Abrasive wear of
steel: Minimal wear occurred with steels 20KhN3A and 20Kh3MA heat-treated
according to method (1). In summary, the best wear resistance under impact
loads was exhibited by steel having a microacicular M structure with a small
amount of uniformly distributed austenite. Under static loads, by contrast, the
wear increased in the presence of RA in the carburized layer. There are 9
figures and 2 tables; no references.

ASSOCIATION: Leningradskiy politekhnicheskiy institut im. M. I. Kalinina
                (Leningrad Polytechnical Institute imeni M. I. Kalinin).

Card 4/4

ABSTRACT: A study was done on iron-base powder metallurgy materials composed of 94 to 99% iron alloyed with nickel, copper, and graphite. Seven mixtures were made: (1,2) graphite alone--1.0 and 3.0%; (3) graphite--1.0%, Cu--3.0%; (4) graphite--3.0%, Cu--3.0%; (5) graphite--1.0%, Ni--3.0%; (6) graphite--3.0%, Ni--3.0%; and (7) graphite--3.0%, Cu--1.5%, Ni--1.5%. Shrinkage and density were given as functions of composition and compacting. Microstructures and mechanical properties were determined on the finished products. Before compacting, the powder mixtures were deoxidized and sifted through a screen. Cylindrical samples of 18 mm height and 10 mm diameter

Card 1/2

ACC NR: AT7004519

were compacted at pressures of 7-12 T/cm^2 and sintered for 2 hrs at temperatures of 1050, 1100, and 1150°C in dissociated ammonia. Cracking occurred above 10 T/cm^2 so for optimum compacting the pressure was kept at 9-10 T/cm^2 resulting in a residual porosity of 14-18%. The sintered density increased as a function of temperature and became constant at 1100°C; however, at 1150°C the macro- and microstructures were more uniform. Ferrite formed for mixtures #1 and #2, while pearlite + cementite developed for the others. For #7 a liquid Cu-Ni solution formed during sintering, giving a compact pearlitic structure with a thin network of cementite. After homogenizing for 2 hrs at 800°C the cementite network dissolved. Maximum hardness was obtained after sintering at 1150°C. Mixture #3 had the highest hardness at 87 R_B. The shrinkage after sintering for 2 hrs at 1150°C was given for each mixture. Mixtures #5, #6, and #7 had the largest volume changes--4, 5, and 6% respectively. The samples were water quenched from 800, 825, and 850°C and tempered for 2 hrs at 180°C. Microstructures and mechanical properties of the heat treated samples showed that every mixture had an optimum quenching temperature. No hardness differences were observed between 1 and 3% graphite. Quenching increased the bending strength, but decreased the impact resistance. The impact resistance, compressive and bending strength decreased after the carbon content increased from 1 to 3%. It was concluded that Cu and Ni increased the mechanical properties of iron-base powder metallurgy materials.

Orig. art. has: 3 figures, 2 tables.

SUB CODE: 11/   SUBM DATE: none

Card 2/2

IERMAKOV, S.S.

Abrasive resistance of tool steel under the effect of repeated
shock loading in liquid media conditions. Trudy LPI no.234:83-
88 '64.   (MIRA 17:11)

YERMAKOV, S.S.

Powder friction material for computer coupling disks. Trudy
LPI no. 251:82-86 '65   (MIRA 19:1)

83276

S/109/60/005/009/026/026
E140/E455

26.1632
9.3120

AUTHORS: Bondarenko, B.V., Yermakov, S.V. and Tsarev, B.M.

TITLE: Thermionic Properties of Alkali-Earth Metal Tantalates

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol.5, No.9, pp.1553-1555

TEXT: This is a continuation of earlier work (Ref.1) in which basic barium tantalate was found to have higher emission properties than barium tungstate. A table of the 22 compounds studied is given on p.1555. It is found that basic barium tantalate has higher emissivity than basic barium tungstate but is less stable thermally. Its limiting temperature is therefore 1500°K, as compared with 1700 to 1800°K for the latter compound. There are 3 figures, 2 tables and 3 Soviet references.

SUBMITTED: April 1, 1960

Card 1/1

29327
S/109/61/006/010/026/027
D201/D3?2

26. 2532

AUTHORS: Bondarenko, B.V., Yermakov, S.V., and Tsarev, B.M.

TITLE: Thermo-electric properties of barium hafnates and perrhenates

PERIODICAL: Radiotekhnika i elektronika, v. 6, no. 10, 1961, 1773 - 1775

TEXT: In conjunction with the results of study of thermo-electric properties of barium tantalates by B.V. Bondarenko, Ye.P. Ostapchenko, and B.M. Tsarev, (Ref. 1: Radiotekhnika i elektronika, 1960, 5, 8, 1246) which were shown to be slightly better than those of barium tungstanate, the authors give the results of their determining thermo-electric properties of barium hafnates of type $(BaO)_n (HfO_2)_m$ with n : m = 2 : 1; 3 : 1; 5 : 1; 7 : 1; and of barium perrhenates $(BaO)_n (Re_2O_7)_m$ with n : m = 1 : 2; 2 : 1; 3 : 1; 5 : 1; 7 : 1; The study of barium hafnates and rhenates with different content of barium oxide was required to determine the influence of barium oxide on the thermoelectric properties of complex oxi-

Card 1/3

Thermo-electric properties of ...

29327
S/109/61/006/010/026/0⬤7
D201/D302

des and to find the composition of oxides which would be stable in vacuum at operating temperatures. A tungsten tape, cleaned by heating in vacuo, was used as the base. The temperature was being determined by a tungsten iridium thermo-couple. The process of activation of cathode consisted of prolonged heating with the outflow of emission current, starting with the temperature corresponding to a low emission $10^{-8} - 10^{-7}$ ampere^2 and ending at the temperature beyon⬤ which the emission started to fall due to the increases work function φ. After the activation has been finished, the emission was measured within a wide range of temperatures after increasing it and decreasing until a stable and reproducible emission current was obtained. All analyzed substances had a minimum of the work function, corresponding to that of a simple model of an n-type semiconductor. The thermoelectric properties of barium hafnates and rh⬤nates as obtained in the experiment are given in tabulated form. The results obtained show that as compared with those of tungstenates and even tantelates of barium, the rhenates, and in particular hafnates of barium have somewhat better emission properties. It is stated in conclusion, however, that until the above substances can

Card 2/3

29327
S/109/61/006/010/026/027
D201/D302

Thermo-electric properties of ...

be recommended for use in thermal emission cathodes, further inves-
tigations into their evaporating and thermal stability properties
have to be carried out. There are 1 table, 2 figures and 1 Soviet-
bloc reference.

SUBMITTED: June 15, 1960

Card 3/3

9,3120
26.1640

AUTHORS: Bondarenko, B. V. and Yermakov, S. V.

TITLE: Thermionic properties of carbides of metals belonging
             to groups IV and V

PERIODICAL: Radiotekhnika i elektronika, v. 7, no. 12, 1962,
             2099-2101

TEXT: Measurements of thermionic emission of some metal carbides
are reported. Experimental diodes had cathodes of W tape with a
thin film of investigated carbide on one side and a thermocouple
on the other side, and Ta anodes. The effective work function was
determined from measured values of temperature and emission cur-
rent density. A linear dependence of work function on temperature
was found in the temperature range investigated. The following va-
lues of the work function $\varphi_E = \varphi_0 + \frac{\partial \varphi}{\partial T} T$ eV are tabulated: TiC:
3.46 + 2.10^{-4} T (1300 - 1750°K) and 3.6 + 1.10^{-4} T (1750 - 2200°K),

Card 1/2

S/109/62/007/012/020/021
D271/D308

·Thermionic properties of ...

ZrC: $3.24 + 2.10^{-4}$ T, HfC: $3.42 + 1.75.10^{-4}$ T, VC: 3.85, practically invariable in the range of $1300 - 2100^\circ K$, NbC: $4.1 - 2.5.10^{-4}$ T, TaC: $3.98 - 1.5.10^{-4}$ T. Work function values at $300^\circ K$, $1400^\circ K$ and $2000^\circ K$ are also tabulated, as well as the carrier concentration at $2000^\circ K$. The sign of the temperature coefficient of the work function depends on the character of doping centers: donor in metal carbides of IV group and acceptor in V group. Zr and Nb carbides are the most promising for use in thermionic cathodes. Current density of 3.6 A/cm^2 was obtained for NbC at $2000^\circ K$. There are 3 figures and 2 tables.

SUBMITTED: May 25, 1962

Card 2/2

-44199

S/109/62/007/012/021/021
D271/D308

9.3120
26.1640

AUTHOR: Yermakov, S. V. and Tsarev, B. M.

TITLE: Thermionic emission of silicides of metals belonging to transitional groups of the periodic system of elements

PERIODICAL: Radiotekhnika i elektronika, v. 7, no. 12, 1962, 2102-2104

TEXT: Measurements of thermionic emission of disilicides of 8 metals are reported and discussed. Silicides were placed on a W-tape, occupying a predetermined section, and a thermocouple was welded to the other side of the tape. The value of effective work function was determined from measurements of temperature and current density. The following values of $\varphi_E = \varphi_0 + \frac{d\varphi}{dT}T$ in eV are tabulated: $ReSi_2$: 4.02 − 2.67.10^{-4} T (1200 − 1900°K), WSi_2: 4.04 − 4.67.10^{-4} T (1200 − 1800°K), $TaSi_2$: 4.42 − 3.8.10^{-4} T (1400 − 1900°K), $MoSi_2$: 4.02 −

Card 1/2

S/109/62/007/012/021/021
D271/D308

Thermionic emission of ...

$5.10.10^{-4}$ T $(1100 - 1800^{\circ}K)$, $NbSi_2$: $4.34 - 5.25.10^{-4}$ T $(1300 - 1700^{\circ}$ K), $ZeSi_2$: $3.95 - 5.10.10^{-4}$ T $(1200 - 1900^{\circ}K)$, VSi_2: $3.26 - 7.5.10^{-5}$ T $(1100 - 1600^{\circ}K)$, $CrSi$: $3.49 - 5.8.10^{-5}$ $(1200 - 1400^{\circ}K)$, Cr_3Si: $2.35 + 6.33.10^{-4}$ T $(1100 - 1400^{\circ}K)$, $CrSi_2$: $3.78 - 1.2.10^{-4}$ T $(1200 - 1450^{\circ}K)$. Values of the work function at 300 and $1400^{\circ}K$ are also given. Some silicides have displayed a fairly strong activation at the beginning of temperature process, but the work function noticeably rises above a certain temperature, up to the limit of the temperature range. Nb silicides have shown activation in the entire range studied. V, Ta, Cr silicides remained in the state of stabilized activity. Formation of SiO_2 film which evaporates at higher temperatures is suggested as an explanation of the observed variations of activity. There are 2 figures.

Card 2/2

S/0109/64/009/001/0180/0181

ACCESSION NR: AP4009992

AUTHOR: Yermakov, S. V.

TITLE: Thermionic emission of thulium hexaboride

SOURCE: Radiotekhnika i elektronika, v. 9, no. 1, 1964, 180-181

TOPIC TAGS: electron emission, thermionic emission, thulium hexaboride, thermocathode, thulium hexaboride emission

ABSTRACT: As no data on the thermionic emission of TmB_6 was known to the author, this substance was tested for thermionic emission. Measurements were made both in sealed tubes (at 10^{-7} torr or better) and in a vacuum device with continuous exhaustion (at 10^{-5} torr). Experimental data on the effective work function, at $A_0 = 12$, acm^{-2} degree^{-2}, and current density for a W tape coated with TmB_6 and for a tape pre-coated with MV-30 alloy or with TaC, for temperatures 1,100-1,800K, are tabulated. It was found that TmB_6 has a

Card 1/2

ACCESSION NR: AP4009992

positive temperature coefficient of 3.3×10^{-4} ev/deg and that at 1,800K, it vaporizes violently. "In conclusion, the author feels it his duty to thank G. V. Samsonov for his specimen of thallium hexaboride." Orig. art. has: 1 figure, 1 formula, and 1 table.

ASSOCIATION: none

SUBMITTED: 11Jul63   DATE ACQ: 10Feb64   ENCL: 00

SUB CODE: GE   NO REF SOV: 002   OTHER: 000

Card 2/2

L 06976-67   EWT(1)/EWP(e)/EWT(m)/EWP(w)/EWP(t)/ETI/EWP(k)   IJP(c)   JD/JG/AI
ACC NR: AP6018361   SOURCE CODE: UR/0089/66/020/005/0439/0440

AUTHOR: Yermakov, S. V.; Tsarev, B. M.

ORG: none

TITLE: Thermionic emission of uranium dodecaboride

SOURCE: Atomnaya energiya, v. 20, no. 5, 1966, 439-440

TOPIC TAGS: uranium compound, tungsten, thermionic emission, work function

ABSTRACT: The thermionic emission of uranium dodecaboride was measured by a pro-
cedure described earlier (Radiotekhnika i elektronika v. 7, 2099, 1962). The sub-
strate was a tungsten ribbon, on which a thin layer (30 -- 50) of a dense sus-
pension of U 12 powder in metal alcohol was deposited. As in the case of hexaboride
of rare earth metals, UB_{12} reacts with the tungsten, causing the latter to curl,
and causing metallic uranium to be deposited on the walls of the bulb. The work
function was determined from the measured values of the temperature and current
density and is found to satisfy the equation $2.89 + 2.3 \times 10^{-4}$ T. Deviations from a
linear dependence, towards lower values of the work function, are observed at 1500
-- 1900 K and are probably due to the start of noticeable reaction between UB_{12} and

UDC: 621.032.273:546.791 + 546.271

Card 1/2

L 06976-67

ACC NR: AP6018361

the tungsten. The region above 1900 K could not be investigated because the limit of the anode current was reached. Attempts to cover the UB_{12} film with iridium powder were also unsuccessful. Comparison with the data on UB_4 and UB_2 indicate that the deviation from linearity at high temperatures can be attributed to gradual transformation of UB_{12} into UB_4 and then UB_2. The authors thank Yu. B. Paderno and G. V. Samson for supplying the sample of uranium dodecaboride. Orig. art. has: 2 tables and 1 formula.

SUB CODE: 18   SUBM DATE: 01Oct65/   ORIG REF: 003   OTH REF: 001

Card 2/2

YERMAKOV, T.G.

Electrification of the East Siberian line. Zhel.dor.transp.
43 no.3:12-17 Mr '61.   (MIRA 14:3)

1. Nachal'nik Vostochno-Sibirskoy dorogi, g. Irkutsk.
       (Siberia, East—Railroads—Electrification)

J

USSR/Soil Science - Tillage. Amelioration. Erosion.

Abs Jour   : Ref Zhur Biol., No 1, 1959, 1410

Author   : Yermakov, V.
Inst   :
Title   : Treatment of Alkaline Soils in Kurganskaya Oblast'

Orig Pub   : S. kh. Sibiri, 1958, No 1, 19-23

Abstract   : No abstract.

Card 1/1

YERMAKOV, V.

Separators which function without failure. Mast ugl. 3 no.6:22
Je '54.
(MLRA 7:7)

1. Nachal'nik ugleobogatitel'noy fabriki shakhty No. 29 kombinata.
    (Coal mining machinery)

YERMAKOV, V.

Improving the safety valve. Avt. transp. 39 no.5:53 My '61.
(MIRA 14:5)

(Air brakes)

YERMAKOV, V.

Device for dismantling bearings. Av.transp. 40 no.7:52 Jl
'62.   (Garages—Equipment and supplies)   (MIRA 15:8)

BARANOVA, G.; BRANDSHTETR, I.; DRUIN, V.; YERMAKOV, V.; ZVAROVA, T.;
KRZHIVANEK, M.; MALY, Ya.; POLIKANOV, S.; SU KHUN-GUY
[Su Hung-kuei]

[Production of Md^{256} through irradiation of U^{238} with Ne^{22} ions,
study of some of its chemical properties] Poluchenie Md^{256} pri
obluchenii U^{238} ionami Ne^{22} i izuchenie ego nekotorykh khimi-
cheskikh svoistv. Dubna, Ob"edinennyi in-t iadernykh issl., 1962.
11 p.   (MIRA 15:1)
      (Mendelevium) (Uranium) (Neon)

YERMAKOV, V., podpolkovnik
        Rates of crossing can be increased. Tekh. i vooruzh. no.3:52-53
        Mr '64.
        (MIRA 17:8)

YERMAKOV, V.

Heater operating with various fuels. Pozh.delo 7 no.12:15 D
'61.   (MIRA 14:11)

1. Nachal'nik pozharno-isrytatel'noy stantsii, Krasnoyarsk.
                    (Stoves)

KULIKOV, D.; YERMAKOV, V.

Use of tanks in fire extinction. Pozh.delo 9 no.10:18-19 O '63.
(MIRA 16:12)

BERANOVA, H.; BRANDSHTETR, I.; DRUIN, V.; YERMAKOV, V.; ZVAROVA, T.;
KZHIVANEK, M. (Krzywánek, M.); MALY, Ya. (Malý, J.); POLIKANOV, S.;
SU HUNG-KUEI

Synthesis of 256 Md as a result of irradiating 238 U with
22 Ne ions and research on some of its chemical properties.
Nukleonika 7 no.7/8:465-471 '62.

1. Ob"yedinennyy institut yadernykh issledovaniy, Dubna, Laboratoriya
yadernykh reaktsiy.

L 7868-66

SOURCE CODE: UR/0209/65/000/007/0024/0028

ACC NR: AP5017031

AUTHOR: Yermakov, V. (Colonel; Military pilot first class; Docent; Candidate of military sciences); Petrukhin, P. (Engineer; Lieutenant colonel)

ORG: none

TITLE: Search for targets of opportunity

SOURCE: Aviatsiya i kosmonavtika, no. 7, 1965, 24-28

TOPIC TAGS: target recognition, air force tactic, aerial reconnaissance, bombing tactic, target discrimination, target acquisition, detection probability

ABSTRACT: In an article based on tactical training experience acquired in aviation units, two military experts discuss sweep and destroy techniques. A search for targets of opportunity may be executed either by a linear or by a grid sweep maneuver, as necessitated by the tactical situation. The two-seater aircraft is superior to the single-seat aircraft in this application since it has an increased search area and a large overlap zone (see Fig. 1). With the use of a pair of two-seater aircraft (see Fig. 2),
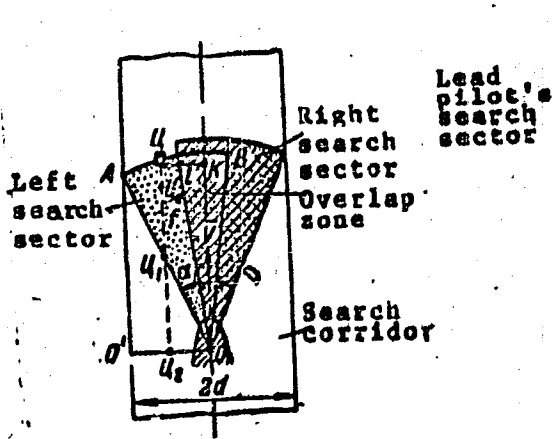
Card 1/4

L 7868-66
ACC NR: AP5017031

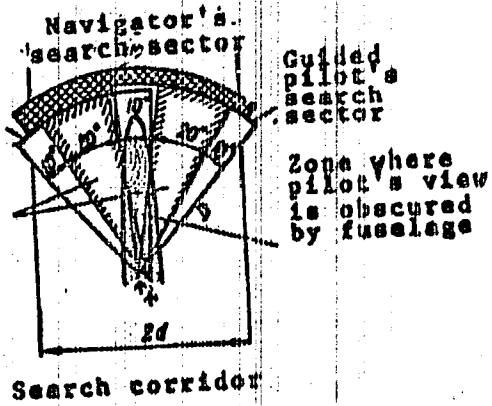Fig. 1. Search corridor
of a single two-seater
aircraft

Fig. 2. Search corridor
of a pair of two-seater
aircraft

Card 2/4

L 7868-66
ACC NR: AP5017031

the conditions for conducting a search are still more favorable, since near the secondary-overlap sector there appears a tertiary-overlap sector. This occurs as a result of the superposition upon each other of the search sectors of the leading and the following aircraft and the zones covered by the navigators.

The area which must be inspected in order to search out and destroy a target may be determined by the formula

$$S = 0.00873 \; V_t^2 \cdot T^2 \cdot \alpha^\circ.$$

where T is the time plotted from the moment the target is detected to the moment the bomber reaches this area, and V_t is the speed required for the target to cover the distance, assuming that immediately after the target's detection it enters into sector α°.

The probability P of a single crew detecting a target can be determined by the formula

$$P = 1 - e^{-\lambda \cdot S(1 - K_H)}.$$

Card 3/4

L 2868-66

ACC NR: AP5017031

where S is the area searched by the crew, λ_1 is the target density per area, K_m is the target-camouflage coefficient ($K_m = 0$ for targets which contrast with the landscape, and $K_m = 1$ for a target which cannot be distinguished from the landscape). If n crews are conducting the search, each of which is observing the area S, and the areas do not overlap, the probability of detecting a single target can be expressed by

$$P = 1 - e^{-\lambda_1 \cdot S (1-K_m)^n} .$$

To insure the effectiveness of the search, an optimal search area per aircraft must be assigned. This can be determined from the nomogram in Fig. 3, using

$$\lambda_1 = \frac{N_t}{ab} ; \quad \lambda_2 = \frac{N_b}{ab} ,$$

where N_t is the number of targets, N_b is the number of antiaircraft guided-missile batteries, a & b are the dimensions of the operational theater (frontal and in depth), and W is the hit probability. Orig. art. has: 6 figures.   /ATD Press: 4138-E/

SUB CODE: 15, 17 / SUBM DATE: none

Card 4/4 ᒪᑌ

Works on Approximate Analysis

Works on Approximate Analysis

SOV/2217

Yarysheva, I. M. Finite Difference Methods of Solving Goursat's Problem   342

Il'in, V. P. On "Embedding" Theorems
                                                                          359

Faddeyev, D. K. On the Condition of Matrices
                                                                          387

AVAILABLE: Library of Congress

Card 5/5

IK/mg
11-10-59

86022

3/052/60/005/004/007/007
C 111/ C 333

$IL.6500$

AUTHORS: Yermakov, S. M., Zolotukhin, V. G.

TITLE: Polynomial Approximations and the Monte-Carlo-Method

TEXT: The authors propose an improved Monte-Carlo method for calculating multiple integrals. The improvement is carried out by reducing the dispersion, whereby the mean quadratic error is reduced for its part.

Let D be the domain of the k-dimensional Euclidean space;

$f(Q) \in L_D^2$; $\varphi_0(Q), \varphi_1(Q), \ldots, \varphi_n(Q) \in L_D^2$, where

$$(1) \quad \int_D \varphi_i(Q) \varphi_j(Q) \, dQ = \begin{cases} 0 \text{ for } i \neq j & i = 0,1,2,\ldots, n \\ 1 \text{ for } i = j & j = 0,1,2,\ldots, n \end{cases} .$$

The linear combinations of the $\varphi_i(Q)$ form the subspace $L_{D,n+1}^2 \subset L_D^2$. If the determinant $W_{n+1}(Q_0, Q_1, \ldots Q_n) =$

Card 1/ 3

86022

Polynomial Approximations and the Monte-Carlo Method

$-$ det $\| \varphi_0(Q_i), \varphi_1(Q_i), \ldots, \varphi_n(Q_i) \|_0^n$ is different from 0, then it holds the approximation formula

$$(2) \quad \int_d f(Q) \varphi_0(Q) \, dQ \approx \frac{\det \| f(Q), \varphi_1(Q_i), \ldots, \varphi_n(Q_i) \|_0^n}{W_{n+1}(Q_0, Q_1, \ldots, Q_n)} \quad .$$

If $f(Q) \in L_{D, n+1}^2$, then the remaining term is equal to zero.

Theorem 1: If $Q_0, Q_1, \ldots, Q_n$ are random points of the k-dimensional Euclidean space, the probability density of which $F(Q_0, Q_1, \ldots, Q_n)$ is equal to $\frac{1}{(n + 1)!} W_{n+1}^2 (Q_0, Q_1, \ldots, Q_n)$, then the mathematical expectation of the random variables

$$\theta (Q_0, Q_1, \ldots, Q_n) = \frac{\det \| f(Q_i), \varphi_1(Q_i), \ldots, \varphi_n(Q_i) \|_0^n}{W_{n+1}(Q_0, \ldots, Q_n)}$$

Card 2/3

86022
S/052/60/005/004/007/007
C 111/ C 333

Polynomial Approximations and the Monte-Carlo Method

is equal to $\int_D f(Q) \; \varphi_0(Q) \; d \, Q$.

Theorem 2: The dispersion of the random magnitude $\theta(Q_0, Q_1, \ldots, Q_n)$ is

$$D^2 \; \theta(Q_0, \ldots, Q_n) = \int_D f^2(Q) dQ - \sum_{i=0}^{n} \alpha_i^2 \text{ , where}$$

$$\alpha_i = \int_D f(Q) \; \varphi_i(Q) \; d \, Q \, , \; i = 0, 1, 2, \ldots, n \quad .$$

The application of the improved method based on these theorems is especially favorable, if the Fourier series of $f(Q)$ with respect to the system $\{\varphi_i\}$ converges quickly to $f(Q)$ in the mean.

The authors thank G. J. Marchuk and J. M. Sobol'.

There are 3 references: 1 Soviet, 1 English and 1 American.

SUBMITTED: July 14, 1959

Card 3/3

33002
S/641/61/000/000/029/033
B102/B138

26.2245

AUTHORS: Yermakov, S. M., Kolesov, V. Ye., Marchuk, G. I.

TITLE: A numerical method for solving the Schrödinger equation with a blurred potential

SOURCE: Krupchitskiy, P. A., ed. Neytronnaya fizika; sbornik statey. Moscow, 1961, 314.- 323

TEXT: If square-well potential or oscillator potential are assumed in shell-model calculations, the problems can be solved analytically. The results, however, will be in worse agreement with experiment than for blurred potentials. A method is described for calculating both the nuclear energy levels and the cross sections. The potential V(r) can be any shape, and have a zero singularity. In scattering problems it may be complex. In the usual way the boundary-value problem

$$\frac{d^2 u(r)}{dr^2} + B(r)u(r) = \varkappa^2 u(r), \qquad \Bigg\} \qquad (1)$$
$$u(0) = 0, \quad u(\infty) = 0 \qquad \Bigg\}$$

Card 1/6

33002
3/641/61/000/000/029/033
A numerical method for solving...   B102/B138

is assumed to have a non-vanishing solution, and

$$B(r) = -U(r) + \gamma \frac{\hbar^2}{4m^2c^2} \frac{1}{r} \frac{\partial U(r)}{\partial r} \sigma \mid - \frac{l(l+1)}{r^2}$$

$$U(r) = \frac{2m}{\hbar^2} V(r), \quad \varkappa^2 = \frac{2m}{\hbar^2} |E|, \quad E < 0.$$

(2)

For $r \to \infty$, $B(r) \to 0$. For $r \to \infty$, the solution of Eq. (1) diminishes exponentially and at $r = H$, $\frac{du(r)}{dr} = -\varkappa u(H)$. So from (1) the system of linear algebraic equations

$$(B_1 h^2 - 2 - \varkappa^2 h^2) u_1 + u_2 = 0;$$
$$u_{l-1} + (B_l h^2 - 2 - \varkappa^2 h^2) u_l + u_{l+1} = 0 \ (l = 2, 3 \ldots, n-1);$$
$$2u_{n-1} + (B_n h^2 - 2 - \varkappa^2 h^2 - 2\varkappa h) u_n = 0.$$

(4)

is obtained, where $h = H/n$. $\varkappa$ is chosen so that the determinant of this system will vanish. $(D_n = 0)$. D_n can be calculated with a recurrent formula: $D_{i+1} = \theta_{n-i} D_i - D_{i-1}$ $(i = 1,2\ldots n-1)$

Card 2/6

33002
S/641/61/000/000/029/033
B102/B138

A numerical method for solving...

$D_0 = 2$, $D_1 = \theta_n - 2\kappa h$; $\theta_i = B_i h^2 - 2 - \kappa^2 h^2$ ($i = 1,2...n$). D_{n-j} is the sub-determinant when the first j rows and columns are deleted. The purely mathematical peculiarities of this method are discussed and, as an example, the greatest root of κ is calculated numerically for

$$B(r) = \begin{cases} 146.1717 - 2/r^2 & \text{for } r \leqslant 1 \\ - 2/r^2 & \text{for } r > 1. \end{cases}$$

This holds for a square-well potential and a nucleus with $A \sim 240$ and $l = 1$. Then the method is applied for calculating neutron scattering cross sections.. The Schrödinger equation for the radial part of the neutron wave function is written as

$$\frac{d^2u(r)}{dr^2} + \left[k^2 - \frac{l(l+1)}{r^2} \right] u(r) = U(r)u(r), \qquad (8)$$

$$U(r) = \frac{2m}{\hbar^2} V(r), \quad k^2 = \frac{2m}{\hbar^2} E, \ E > 0.$$

the potential $V(r)$ may contain a spin-orbit term. For $r = H$, $|V(H)| < \varepsilon$, for $r \to \infty$, $V(r) \to 0$. With the conditions $u(0) = 0$ and

Card 3/6

33002
S/641/61/000/000/029/033
B102/B138

A numerical method for solving...

$\left|\dfrac{du(r)}{dr}\right|_{r=H}$ = $\lambda u(H)$ the problem is reduced to the boundary problem

$$(S_1 h^2 - 2) u_1 + u_2 = 0,$$
$$u_{i-1} + (S_i h^2 - 2) u_i + u_{i+1} = 0 \ (i = 2, 3, \ldots, n-1),$$
$$2u_{n-1} + (S_n h^2 - 2 + 2h\lambda) u_n = 0. \tag{11}$$

$$S(r) = R^{(1)} - \frac{l(l+1)}{r^2} - U(r).$$

and the determinant Δ_n = 0 is found by using the above recurrent formula:

$\Delta_i = \omega_i \Delta_{i-1} - \Delta_{i-2}$ (i = 2,3...n-1); Δ_0 = 1, Δ_1 = ω_1,

$$\lambda = \frac{1}{2h} \left[2 \frac{\Delta_{n-1}}{\Delta_{n-1}} - \omega_n \right]. \tag{13}$$

If $V(r)$ is complex, $S(r) = S^{(1)}(r) + iS^{(2)}(r)$, $\lambda = \lambda_1 + i\lambda_2$, $\Delta = P + iQ$
and $\omega = p + iq$.
Card 4/6

A numerical method for solving...

33002

S/641/61/000/000/029/033
B102/B130

$$P_i = p_i P_{i-1} - P_{i-2} - q_i Q_{i-1},$$
$$Q_i = p_i Q_{i-1} - Q_{i-2} + q_i P_{i-1},$$
$$P_0 = 1, \quad P_1 = p_1, \quad Q_0 = 0, \quad Q_1 = q_1,$$

(17)

(18)

$$p_i = S_i^{(1)} h^2 - 2, \quad q_i = S_i^{(2)} h^2$$
$$(i = 2, 3, \ldots, n-1).$$

$$\lambda_1 = \frac{1}{2h} \left[2 \frac{P_{n-1} P_{n-2} + Q_{n-1} Q_{n-2}}{P_{n-1}^2 + Q_{n-1}^2} - p_n \right],$$
$$\lambda_2 = \frac{1}{2h} \left[2 \frac{P_{n-1} Q_{n-2} - Q_{n-1} P_{n-2}}{P_{n-1}^2 + Q_{n-1}^2} - q_n \right].$$

(19)

results. If $\Delta_0 = \omega_0$ and $\Delta_1 = \omega_0 \omega_1 - 2$, and the potential is real,

$$P_0 = p_0, \quad P_1 = p_0 p_1 - q_0 q_1 - 2,$$
$$Q_0 = q_0, \quad Q_1 = p_0 q_1 + q_0 p_1$$

(18a)

Card 5/6

33002
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B102/B138

A numerical method for solving...

if it is complex, $\omega_0 = S_0 h^2 - 2 - 2h\pi$, $p_0 = S_0^{(1)} h^2 - 2 - 2h\pi_1$,

$q_0 = S_0^{(2)} h^2 - 2h\pi_2$, $\pi = \pi_1 + i\pi_2$. A numerical example is calculated for a Woods-Saxon potential and compared with experimental data. There are 4 figures, 3 tables, and 13 references: 6 Soviet and 7 non-Soviet. The four most recent references to English-language publications read as follows: D. J. Hughes, R. B. Schwartz, Neutron Cross Sections. B. N. L. N. Y. 1958; H. C. Bolton, H. I. Scoins. Proc. Camb. Phil. Soc. 52, 215 (1956); M. Walt, H. H. Barschall. Phys. Rev. 93, 1062 (1954); J. R. Beyster et al. Phys. Rev. 104, 1319 (1956).

Card 6/6

YERMAKOV, S.M.

Exact evaluation of the remainders of formulas of mechanical
cubage and multidimensional interpolation. Dokl.AN BSSR 6
no.2:73-76 F '62.   (MIRA 15:2)

1. Predstavleno akademikom AN BSSR V.I.Krylovym.
                   (Functional analysis)

YERMAKOV, S.M.; ZOLOTUKHIN, V.G.; PETROV, E.Ye.

Calculating the passage of neutrons through a plane polyethylene
layer. Atom. energ. 15 no.3:253-255 S '63.   (MIRA 16:10)

(Neutrons—Capture)   (Shielding (Radiation))

YERMAKOV, S.M. (Moskva)

Interpolation over random points. Zhur.vych.mat.i mat.fiz. 3
no.1:186-190 Ja-F '63.   (MIRA 16:2)
                    (Interpolation)   (Probabilities)

ACCESSION NR: AT4019045   S/0000/63/000/000/0171/0181

AUTHOR: Zolotukhin, V. G.; Yermakov, S. M.

TITLE: Application of the Monte Carlo method to the computation of nuclear radiation shielding

SOURCE: Voprosy* fiziki zashchity* reaktorov; sbornik statey (Problems in physics of reactor shielding; collection of articles). Moscow, Gosatomizdat, 1963, 171-181

TOPIC TAGS: nuclear reactor, reactor shielding, radiation shielding, Monte Carlo method, radiation transfer, scattering, neutron propagation, quadrature formula

ABSTRACT: The article contains a brief summary of the fundamental techniques for increasing the statistical efficiency of the Monte Carlo method with respect to problems of radiation transfer. The most important of the techniques discussed in the article have been proven on the basis of a large number of concrete problems. The author notes, by way of introduction, that considerable mathematical difficulties are encountered while solving the kinetic equation with consideration of the energy dependence of the cross sections, the anisotropy of the processes of scattering and the finite geometry. Because of this fact, in many cases the Monte Carlo method provides the only means of solving the problem.

Card 1/4

ACCESSION NR: AT4019045

The application of this method to problems involving the passage of neutrons and gamma quanta through a substance is possible due to the absence of any interrelation between the particles in real beams. The difficulties that arise in connection with the use of the Monte Carlo method are concerned primarily with the determination of small probabilities. In problems connected with the passage of radiation through a substance, the smallness of the probability p may be occasioned by the absorption of the particles, their leakage from the medium, energy losses as the result of slowing, etc. It is pointed out that the Neuman series for the solution of the kinetic equation reduces the radiation transfer problem to the computation of multiple intervals, while the Monte Carlo method itself consists essentially in the calculation of the terms of a Neuman series which are the multiple intervals. The use of non-random points, in the opinion of the authors, implies a repudiation of the probabilities of the Monte Carlo scheme, eliminating the possibility of a practical evaluation of the accuracy of the results. In those cases in which interest attaches to a particular functional of the kinetic equation solution, the methods which are described in this article for increasing the statistical effectiveness of the method normally provide an accuracy quite satisfactory for practical purposes with a number of histories ranging from

Card   2/4

ACCESSION NR: AT4019045

10^3 to 10^4. The authors describe the method of conditional probabilities (in American technical literature this method is known as the method of analytical averaging). It is noted that different modifications of this method are possible, all being based on the introduction of the transitional probability $K(x \to x)$, connected with $K(x \to x)$ by the formula

$$K(x \to x') = \frac{K(x \to x')}{\int_{(D)} K(x \to x') dx'}, \tag{1}$$

where (D) is the region of space T in which the function $\varphi(x)$ assumes the greatest values. The semi-analytical Monte Carlo method is briefly discussed. This method is based on the use of analytical solutions (provided such are possible) for certain ramifications of the basic straying process. The essential idea of the "control variable method" is explained. This technique is sometimes also called the "correlation sampling method". The point is made that the chief difficulty in the use of this method consists in finding random values $\zeta_1, \ldots, \zeta_n$, of high correlation with ζ_0, the mathematical expectancies of which are known. The method of local stream calculation is discussed and examples of its use are given. The use of quadrature formulas with random nodes is analyzed, and it is noted that the further development of the general methods for reducing the dispersion, based on the construction of interpolation-quadrature formulas, permits the formulation of

Card 3/4

ACCESSION NR: AT4019045

quadrature expressions with random nodes of high accuracy, which are very useful for practical applications. A final section of the article deals with problem-solving through the use of high-speed electronic computers. Orig. art. has: 19 formulas.

ASSOCIATION: none

SUBMITTED: 14Aug63   DATE ACQ: 27Feb64   ENCL: 00

SUB CODE: NP   NO REF SOV: 010   OTHER: 005

Card   4/4

MIKHAYLUS, F. F.; ZOLOTUKHIN, V. G.; YERMAKOV, S. M.

"Solution methods of transport equation in inhomogeneous and finite media."

report submitted for 3rd Intl Conf, Peaceful Uses of Atomic Energy, Geneva,
31 Aug-9 Sep 64.

(BR)

ACCESSION NR: AP4037259

S/0208/64/004/003/0550/0554

AUTHOR: Yermakov, S. M. (Moscow)

TITLE: Random quadratures of raised accuracy

SOURCE: Zhurnal vy*chislitel'noy matematiki i matematicheskoy fiziki, v. 4, no. 3, 1964, 550-554

TOPIC TAGS: random quadrature, Monte Carlo, spherical singularity, mechanical quadrature, random node, iteration quadrature formula, Gaussian quadrature, Fourier coefficient

ABSTRACT: The author studies quadrature formulas (with random nodes) of raised accuracy which are, in a sense, analogs of Gaussian quadratures. He computes the mean and the dispersion for the corresponding quadrature sum for inference on the size of the error of the constructed quadrature formulas. Orig. art. has: 8 formulas.

ASSOCIATION: none

SUBMITTED: 29Jun63

DATE ACQ: 09Jun64

ENCL: 00

SUB CODE: MA

NO REF SOV: 002

OTHER: 002

Card 1/1

BUBLIK, Yu.I.; YERMAKOV, S.M.; YEFIMENKO, B.A.; ZOLOTUKHIN, V.G.; PETROV, E.Ia.

Gamma-ray dose from a unidirectional source near the soil-air interface.
Atom. energ. 18 no.6:628-629 Je '65.
(MIRA 18:7)

L 6469-66   EWT(m)/EPF(c)/ETC/EPF(n)-2/EWG(m)   WW/DM
ACCESSION NR: AP5019817

UR/0049/65/019/001/0071/0073
539.142:539.121.72

AUTHOR: Yermakov, S. M.; Petrov, E. Ye.

TITLE: Concerning the passage of γ quanta through shielding barriers

SOURCE: Atomnaya energiya, v. 19, no. 1, 1965, 71-73

TOPIC TAGS: reactor shielding, water, lead, Gamma radiation, Gamma scattering

ABSTRACT: The authors describe an effect connected with the passage of γ quanta through a flat shield consisting of two components, a primary layer of water and a secondary layer of lead. The effect consists in the fact that in the case when hard gammas are incident on the shield at large inclination to the normal direction, an increase in the thickness of the water may lead to an increase in the intensity of radiation transmitted through the shield. The reasons for the phenomenon are briefly explained. The effect was observed during the course of an analysis of Monte Carlo calculations of the passage of γ rays through multilayer shielding barriers, in which account was taken of Compton scattering and absorption due to the photoeffect and to pair production. The calculations were made for a multidirectional monoenergetic radiation source. The effect takes place at angles exceeding 82° and energies above 6 Mev. The variation of the radiation characteristic with the thickness of the water layer is briefly discussed. "The

Card 1/2

L 6469-66
  ACCESSION NR: AP5019817

  authors thank N. F. Kham'yanov for the electronic-computer calculations." Orig.
  art. has: 5 figures.

  ASSOCIATION: none

  SUBMITTED: 13Aug64   ENCL: 00   SUB CODE: RP

  NR REF SOV: 000   OTHER: 000

Card 2/2

L 5066-65   EWT(m)   DIAAP   DM

ACC NR: AP5022639   UR/0089/65/019/002/0179/0180

AUTHOR: Gromov, B. F.; Yermakov, S. M.; Kazarnikova, Ye. Ye.;
Solodyankin, M. A.   26
                                                                 B

TITLE: Angular and energy distribution of gamma radiation on the
surface of a volume source
                                                                /9

SOURCE: Atomnaya energiya, v. 19, no. 2, 1965, 179-180

TOPIC TAGS: nuclear reactor, gamma radiation, nuclear physics apparatus

ABSTRACT: Many layers of material are usually placed in nuclear reac-
tors between the reactive core itself and the outside surface of the
shield. Therefore, various attenuation processes must be taken into
account in calculations of biological shielding. The authors investi-
gated the angular and energy distribution of gamma radiation on the out-
side surface of the reactor. The results of their research are given
for two cases. In one case, the reactor vessel was protected in water
by a boron shield while in the other case no boron shielding was
provided. The Monte Carlo method was used for calculations by means of
M-20 electronic computing machine. It was assumed, that the gamma rays
were generated at the initial energy levels of 2, 3, 4, 5, 6 and 7 Mev.

Card 1/2   UDC: 539.122:539.121.73:539.121.64

L 5066-66

ACC NR: AP5022639

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The greatest statistical error after 12000 tests was less than 25% for angular and 20% for energy distributions. The distributions applied to two above mentioned cases and seven energy levels were illustrated by two sets of histograms. The attenuation of 7 Mev gamma radiations in lead shields was also analyzed. The results of this analysis expressed in dose rates were tabulated and graphically illustrated.

ASSOCIATION: None

SUBMITTED: 20Mar65   ENCL: 00   SUB CODE: NP

NO REF SOV: 000   OTHER: 000

Card 2/2

L 00065-66   EWT(m)/EPA(w)-2/EWA(m)-2   IJP(c)

ACCESSION NR: AP5021324   UR/0120/65/000/004/0026/0029
                                                   539.1.074

AUTHOR: Teplyakov, V. A.; Yermakov, S. M.; Makarov, A. I.; Gendel', Yu. G.;
Krasnovskiy, V. I.; Shembel', B. K.

TITLE: The use of accelerating field focusing in the beginning part of a linear
ion accelerator

SOURCE: Pribory i tekhnika eksperimenta, no. 4, 1965, 26-29

TOPIC TAGS: MEV accelerator, ion beam focusing, particle accelerator component

ABSTRACT: The beginning part of an accelerator (b.p.a.) is distinguished by large
relative velocity increments within the gaps of the accelerating system. The
existing theory of accelerating field focusing is applicable to accelerators with
small velocity increments only (1-2%) and describes only poorly the ion motion
with the b.p.a.. Such a focusing was tested only on electron models of 4—7 MEV
proton linear accelerators and the present authors tested the accelerating field
focusing in a b.p.a. with velocity increments of 5—15% and an injection energy
of 50 kEV with an operative wavelength of 5 m. This article describes the instru-
ment and by comparing the proton spectra at its exit (drift tubes with a channel

Card   1/2

L 00065-66

ACCESSION NR: AP5021324

having rectangular or circular cross section) shows that the focusing by means of the accelerating field is quite effective. "The authors thank A. P. Fedokov for his participation during the accelerator design, B. K. Kondrat'yev, R. P. Kuybide, and V. I. Moguchev for their part in putting the device into operation, and A. I. Trikin for his help in carrying out the experiments." Orig. art. has: 4 figures.

ASSOCIATION: None

SUBMITTED: 27May64   ENCL: 00   SUB CODE: NP

NO REF SOV: 003   OTHER: 000

Card   2/2

L 06993-67   EWT(m)/EWP(t)/ETI   IJP(c)   JD/WW/JG/JR
ACC NR: AP6021522   SOURCE CODE: UR/0089/66/020/006/0469/0473

AUTHOR: Goryachev, I. V.; Dulin, V. A.; Yermakov, S. M.; Kolyshenkova, V. V.;
Suvorov, A. P.; Trykov, L. A.

ORG: none

19

TITLE: Angular distribution of fast neutrons behind iron shields

SOURCE: Atomnaya energiya, v. 20, no. 6, 1966, 469-473

TOPIC TAGS: neutron distribution, fast neutron, angular distribution, reactor
shielding, iron

ABSTRACT: The authors have measured the angular and energy distributions of fast
neutrons behind iron shields of 10 and 15 cm thickness. The results of the experi-
ment are compared with calculations by the Monte Carlo method and with many-group
calculations by the "transmission" matrix method in the $2P_7$ approximation. The
results of the calculations show that the transmission of the shield depends
strongly on the angular distribution of the incident radiation. The transmission
measurements were made using an RIZ uranium-water reactor with a stainless steel
reflector. The agreement of the experimental and the calculated data are found to

Card 1/2   UDC: 539.125.52

L 06993-67
ACC NR: AP6021522   /

be satisfactory both in absolute magnitude and in the form of the angular distribu-
tions. A study was also made of the difference in character of the spatial and
angular distributions of fast neutrons from a point source in an infinite homo-
geneous medium and from a point source located at a plane barrier. The results
show that the allowance for the thickness of the shield leads to a steeper fall off
in the neutron flux than in the case of an infinite medium. Other differences be-
tween infinite and finite shields are also pointed out. The authors thank Yu. A.
Kazanskiy for valuable advice and discussions. Orig. art. has: 5 figures and 1
formula.

SUB CODE: 18   SUBM DATE: 04Sep65/   ORIG REF: 013/   OTH REF: 004

Card 2/2   LC

L 05049-67   EWT(m)   JR/GD

ACC NR: AT6027921   SOURCE CODE: UR/0000/66/000/000/0067/0071

AUTHOR: Yermakov, S. M.; Prokof'yeva, Z. A.   49

ORG: None   B+1

TITLE: Use of the Monte Carlo method in shielding calculations

SOURCE: Voprosy fiziki zashchity reaktorov (Problems in physics of reactor shielding); sbornik statey, no. 2. Moscow, Atomizdat, 1966, 67-71

TOPIC TAGS: Monte Carlo method, radiation shielding, computer programming

ABSTRACT: The authors consider some procedural problems associated with the compilation of programs for solving problems in nuclear radiation shielding by the Monte Carlo method.   There are two classical approaches in using this method for calculating the passage of radiation through matter: 1. modeling the behavior of a neutron or γ-quantum in the medium and 2. writing out the solution for the integral equation of radiation transfer in the form of an infinite series with terms which are multiple integrals of increasingly higher order (Neumann series) with subsequent application of the Monte Carlo method for calculating these terms.   Two problems are considered: the general structure of a program for shielding calculation and the structure of an elementary unit for general shielding geometry.   It is assumed in the discussion that the reader is familiar with the Monte Carlo method as presented in works by Buslenko,

Card   1/2

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ACC NR: AT6027921 O

Zolotukhin, Vladimirov and others where it is shown that penetration of radiation
through matter may be given in terms of the phase coordinates of the particles along
its trajectory. A procedure is described for compiling a program to follow this tra-
jectory. Particular emphasis is given to that part of the program for determining the
distances travelled by the particle in moving from a given point in a given direction
before exit from the medium. An algorithm in ALGOL-60 language is given in the form of
a procedure for determining these distances and correlating the corresponding numbers.
The resulting geometric unit may be useful in other computational methods, e. g. for
constructing three-dimensional nets for difference methods. Orig. art. has: 1 formu-
la.

SUB CODE: 12, 09/ SUBM DATE: 12Jan66/ ORIG REF: 003

Card   2/2

C. YERMAKOV, Sh. N.

//E

Chair of Faculty
Therapy

Influence of ascorbic acid, nicotinic acid, and vitamin B_1 on extrasecretory function of pancreas (especially in ail-ments of the liver and bile passage). Sh. N. Yermakov (Naval Med. Acad., U.S.S.R.). Terapevt. Arkh. 11, No. 1, 69-9(1940).—Administration of 500 mg. ascorbic acid intravenously stimulated the extra-secretory pancreatic function within 30 min., increasing trypsin, amylase and lipase. Nicotinic acid (100-150 mg.) gave less pronounced effect and trypsin and amylase usually declined to near normal levels within 1.5 hrs. Vitamin B_1 had no stimulating effect and large amts. sometimes led to decreased pancreatic function.   O. M. Kasabogl

YERMAKOV, S.P.

The "Bolshiye Voronki" Cave in Pahiya. Zemlevedenie 4:67-80 '57.
(Pashiya—Caves)   (MIRA 10:9)

YERMAKOV, S. S.

YERMAKOV, S. S.   "Investigation of Steel for the Cutting Edges of
Drills." Min Higher Eucation USSR. Leningrad
Polytechnic Inst imeni M. I. Kalinin, Leningrad,
1956. (Dissertation for the Degree of Candidate
in Sciences)
Technical

So: Knizhaya Letopis', No. 17, 1956

YERMAKOV, S. S.

"An Investigation of the Geometry of a Cardan Suspension With
the Aid of a Stereographic Projection," by S. S. Yermakov, Moscow,
Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk,
No 6, Jun 57, pp 58-63

The article introduces a graphical method of solving a series of
problems which are encountered in an investigation of the geometry of a
Cardan suspension. The method makes use of a stereographic projection and
is based on the method of analysis employed by V. V. Dobrovol'skiy in his
work, Teopiya Sfericheskikh Mekhanizmov, (The Theory of Spherical Mecha-
nisms), Moscow, 1947.

The author first locates the stereographic image normal to the plane
of a Cardan ring on a reference plane connected to a stationary base, then
determines the angle of inclination of a second Cardan ring in relation to
the stationary base; next he determines the angle between the swinging axes
of the Cardan rings and the line of intersection of the plane of the second
Cardan ring and the plane connected to the stationary base. Then he locates,
on the reference plane connected to the stationary base, the stereographic
image of a point in the plane of the second Cardan ring, and finally, de-
termines the angles between the plane of the second Cardan ring and the
plane connected to the stationary base, which are measured in various planes
passing through the center of the suspension. (U)

Sum in 1467

YERMAKOV, S. S

24-6-10/24

AUTHOR: Yermakov, S. S. (Moscow).

TITLE: Analysis of the geometry of the gimbal suspension with the help of stereographic projection. (Rassmotreniye geometrii kardannogo podvesa pri pomoshchi stereograficheskoy proyektsii).

PERIODICAL: "Izvestiya Akademii Nauk, Otdeleniye Tekhnicheskikh Nauk" (Bulletin of the Ac.Sc., Technical Sciences Section), 1957, No.6, pp.58-63 (U.S.S.R.)

ABSTRACT: The problem of expressing the relations between the different angles defining the position of a gimbal mounting is considered. Previous work has used spherical trigonometry or Cartesian projections of a unit vector. The present paper uses the construction in a plane, with the help of stereographic projection, of geometric figures which are in mutually unique correlation with geometric figures given on a spherical surface. The plane coincides with that of one of the great circles. The methods used by Dobrovol'skiy, V.V. (The theory of spherical mechanisms, Mashgiz, Moscow, 1947) and the properties discovered by Fedorov, Ye. S. (A course in crystallography, Rikker, St. Petersberg, 1901) are the foundations of the present study. Geometric constructions by the drawing of lines and

Card 1/2

AUTHOR: Yermakov, S. S., Candidate of Technical Sciences 129-7-10/16

TITLE: On the content of carbon in case hardening steels.
(O soderzhanii ugleroda v tsementuyemykh stalyakh).

PERIODICAL: "Metallovedenie i Obrabotka Metallov" (Metallurgy and
Metal Treatment), 1957, No.7, pp. 43-45 (U.S.S.R.)

ABSTRACT: Ipatov, N. K. (4) investigated the resistance to repeated
impact of case hardened carbon steels containing 0.16 and
0.23% C and arrived at the conclusion that an increase in
the C content from 0.16 to 0.23% and an increase of the
case hardening depth brings about an increase of the
impact strength of steel and the higher the carbon content
of the case hardened steel the more harmful is the effect
of the case hardening. His conclusions may not be fully
justified since his investigations were not long enough
and amounted to only about 10 000 impact cycles and also
he did not take into consideration the ratio of the area
of the case hardened layer to the area of the entire cross
section. To establish the optimum carbon content in
case hardening steels 12 mm dia. 150 mm long specimens
made of the Steels 10, 20, 35 and 45 were carburised for
durations of 2 to 20 hours at 900 to 920 C in a solid
carburising agent. The respective C contents were

Card 1/2

YERMAKOV, S.S.

AUTHOR: Vyaznikov, N.F., Yermakov, S.S.   32-9-20/43

TITLE: A Method of the Investigation of Fatigue by Impact in Steel
            (Metodika issledovaniya stali na udarnuyu ustalost')

PERIODICAL: Zavodskaya Laboratorija, 1957, Vol. 23, Nr 9, pp 1095-1097 (USSR)

ABSTRACT: The authors developed a method for the determination of the in-
            fluence exercised by the liquid medium upon the impact fatigue re-
            sistance of steel and carried out a corresponding investigation. The
            scheme of a machine and the experimental method are described. The
            recorded curves for continuous impact strength of the case-hardened
            samples are given in form of the dependence of a number of impacts
            until destruction upon the energy of the single impact. It is shown
            that the most resistant steel in the case-hardened state both in the
            air and in the liquid medium is the steel 20 KhN3A. From a comparison
            of the curves obtained when investigating in the solution and in the
            air, it may be seen that in the case of all types of steel a decrease
            of impact-fatigue-strength may be observed when investigation is
            carried out in the solution. In the case of short investigations
            (20-40 min.) in the liquid medium this decrease amounted to 38-42%,
            in the case of tests of long duration (45-50 hours) it amounts to
            53-55%. In order to determine the influence exercised by the compo-

Card 1/2   sition of the solution on the decrease of the strength of steel,

32-9-20/43

A Method of the Investigation of Fatigue by Impact in Steel

comparative impact-fatigue-tests were carried out with case-hardened
samples of 12 KhN2A steel in pure distilled water, in the air, and
in a solution. It is shown that the greatest decrease of impact
strength was observed in the case of the test carried out in the
solution. The investigation of the destroyed sample showed that the
working surface of the sample had no oxide film as a result of a
test carried out in distilled water, in contrast to the surface
obtained by the investigation carried out in the solution. It is
assumed that, besides the phenomena of the adsorption and strutting
effect, the reduction of impact strength is caused also by the
effect of corrosion. In the case of short experiments the effect of
corrosion is of no importance, but with an increase of the duration
of the experiment the role played by it increases steadily. The data
obtained agree well with the tests carried out in nature with
drilling milling cutters (the latter developed in a liquid medium
under cyclical impact stresses). There are 3 figures, 1 table and
3 Slavic references.

AVAILABLE: Library of Congress

Card 2/2

SOV/137-58-10-21617

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 10, p 166 (USSR)

AUTHORS: Nekhendzi, Yu.A., Vyaznikov, N.F., Yermakov, S.S.

TITLE: New Types of Steel for Manufacture of Cutters of Drilling Bits and Methods of Their Investigation (Novyye stali dlya sharoshek burovykh dolot i metodika ikh issledovaniya)

PERIODICAL: Materialy Mezhvuz. nauchn. soveshchaniya po vopr. novoy tekhn. v neft. prom-sti, 1958, Vol 3, pp 111-127

ABSTRACT: Factors affecting the destruction of cutters of drilling bits (CDB) were investigated and a number of requirements which must be satisfied by steels of which the CDB are made were developed. Comparative impact-strength tests were performed on 11 different types of steel. It was established that the increase in impact strength, produced during surface hardening of the CDB by means of cementation, is decisively affected by the strength of the carburized layer (CL), rather than by the magnitude and nature of distribution of the residual and surface stresses. It is therefore essential that such alloying elements as Ni, Cu, etc., which tend to reduce brittleness and increase the strength and plasticity of the CL be introduced into

Card 1/2

SOV/137-58-10-21617

New Types of Steel for Manufacture of Cutters of Drilling Bits (cont.)

carburized steels employed for the manufacture of the CDB. The greatest
increase in impact strength as a result of carburization is observed when the
ratio of the depth of the CL to the radius of the specimen amounts to 0.18-
0.22, and the ratio of the surface of the CL to the surface of the entire spec-
imen amounts to 0.36-0.38. It is found that the following types of steels com-
bine optimal mechanical properties with high impact strength: 1)
25Kh2GN2D2F steel containing 0.2-0.28% C, 0.3-0.4% Si, 0.8-1.1% Mn, 1.5-
1.8% Cr, 1.8-2.2% Ni, 0.15-0.2% V, and 1.8-22% Cu; R_C, 44-37; σ_s, 158-
141 kg/mm^2; σ_b, 169-152 kg/mm^2; ψ, 48.3-53.6%; δ, 7.95-10.1%; a_k,
7.6-13 kgm/cm^2; 2) 25Kh2GN2T steel containing 0.2-0.28% C, 0.3-0.4% Si,
0.8-1.1% Mn, 1.5-1.8% Cr, 1.8-2.2% Ni, 0.8-0.15% Ti; R_C, 44-38; σ_s, 150-
138 kg/mm^2; σ_b, 163-152 kg/mm^2; ψ, 48.8-52.6%; δ, 8.8-9.9%; a_k, 7.3-
9 kgm/cm^2; 3) 25KhNFR steel containing 0.2-0.28% C, 0.3-0.4% Si, 0.6-
0.8% Mn, 0.9-1.2% Cr, 0.9-1.2% Ni, 0.15-0.2% V, 0.003-0.004% B; R_C, 39-
32; σ_s, 147-134 kg/mm^2; σ_b, 156-145 kg/mm^2; ψ, 42.3-49.6%; δ, 7.5-
8.7%; a_k, 8-9.38 kgm/cm^2.

1. Drills--Production   2. Cutting tools--Materials   3. Steel--Physical
properties

I.B.

Card 2/2

AUTHORS: Vyaznikov, N. F., Yermakov, S. S.   SOV/163-58-3-39/49

TITLE: Residual Stresses in Steels at Chemical and Thermal Treatment
              (Ostatochnyye napryazheniya v stali pri khimiko-termicheskoy
              obrabotke)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958,
              Nr 3, pp 236 - 241 (USSR)

ABSTRACT: The influence exerted by the composition of the steel on
              the extent and the character of the distribution of
              the residual stresses in cementite samples was investigated,
              and the extent and the character of the distribution of
              the residual tension in the subsurface region and the
              structure of the cementite layer were determined. The
              investigations were carried out with the steel samples
              25Kh2GT and 25Kh2GN2T . To investigate the influence exerted
              by carbon on the extent and the distribution character
              of the residual stress carbon steels of the types 20, 30
              and 40 were cemented at depths of 1,5 - 1,6 mm. The
              cementation of the samples was carried out in the carbonizer
              at temperatures of 910-920° within 3-20 hours. Then the
Card 1/2   samples were again hardened in oil at 780-800°. From

Residual Stresses in Steels at Chemical and Thermal   SOV/163-58-3-39/49
Treatment

         the investigations carried out may be seen that with
a cementation layer of a thickness of up to 1,6 mm
in all samples the residual tension decreases, which
is also the case when the carbon content of the steel
is increased. When the diameter of the samples increases
and the thickness of the layer of cementite remains
the same the extent of the surface compression stress
is increased. Until the optimum thickness of the cementite
layer is reached the change of the residual stress pro-
ceeds on the melting curve. With a thicker cementite
layer a removal of the residual tension is observed. There
are 3 figures, 2 tables, and 6 references, all of which are
Soviet.

ASSOCIATION: Leningradskiy politekhnicheskiy institut (Leningrad Poly-
technical Institute)

SUBMITTED: October 1, 1957

Card 2/2

18(7),18(3)

AUTHORS: Nekhendzi, Yu. A., Vyaznikov, N. F.,   SOV/163-58-4-43/47
Yermakov, S. S.

TITLE: New Compositions of Casehardening Steel (Novyye sostavy
tsementuyemoy stali)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 4,
pp 240-247   (USSR)

ABSTRACT: The present investigation was carried out at the laboratoriya
termoobrabotki i liteynaya laboratoriya LPI (Laboratory for
Heat Treatment and Foundry Work at the Leningrad polytechnical
Institute). The results of an investigation of standard steels
18KhGT and 25Kh2GT (formerly used for milling cutters), and
those of four new casehardening steels (suggested by the authors)
are given. The new steels are: 25Kh2GN2D2F , 25Kh2GN2T and
25KhNFR. The method, the determination of critical points, the
investigation of depth hardening capacity, the investigation of
mechanical properties, the investigation of the steel for repeated
impact, the investigation of the influence of hardening layer
depth and steel composition on fatigue impact strength, the
investigation of fatigue impact strength of steel in air and

Card 1/2

New Compositions of Casehardening Steel   SOV/163-58-4-43/47

in liquid medium is given. The investigation showed that the
introduction of nickel and copper into the casehardening steel
increases the fatigue impact strength of steel. The fatigue
impact strength of steel increases, on account of casehardening,
only to a certain depth of the hardening layer. The optimum
depth of the hardening layer is obtained at a ratio of 0.18-0.22
between depth of layer and radius. In the investigation of the
casehardened samples for fatigue impact strength in liquid
medium, the impact endurance limit of the steel decreases
strongly both in continuous tests (50-55 hours) and in
short-termed tests (30-40 minutes). The new types of steel
suggested here can be recommended for the production of parts
stressed by repeated impact. There are 4 figures, 2 tables, and
6 Soviet references.

ASSOCIATION: Leningradskiy politekhnicheskiy institut
              (Leningrad Polytechnic Institute)

SUBMITTED: October 1, 1957

Card 2/2

YERMAKOV, S.S., kand.tekhn.nauk

Dependence of steel resistance to shock on tempering temperature.
Izv. vys. ucheb. zav.; chern. met. no.7:157-162 Jl '58.
(MIRA 11:10)

1. Leningradskiy politekhnicheskiy institut.
         (Steel--Testing)   (Tempering)

SOV/129-58-9-14/16

AUTHOR: Yermakov, S. S., Candidate of Technical Science

TITLE: Book Review (Retsenziya)

PERIODICAL: Metallovedeniye i Obrabotka Metallov, 1958, Nr 9,
             pp 55-57 (USSR)

ABSTRACT: The book "Manufacture of Iron Powder" by G.V.Samsonov
             and S.Ya.Plotkina, Metallurgizdat, 1957 is reviewed by
             S. S. Yermakov

             1. Iron powders--Production

Card 1/1

AUTHORS: Yermakov, S. S., Yosipovich, Ye. M. (Moscow)   103-19-5-2/14

TITLE: A Method of Forming Transmission Functions of Sampled-
            -Data Control Systems With Extrapolating Devices (Metodika
            sostavleniya peredatochnykh funktsiy impul'snykh sistem
            regulirovaniya, soderzhashchikh ekstrapoliruyushchiye
            ustroystva)

PERIODICAL: Avtomatika i Telemekhanika, 1958, Vol. 19, Nr 5,
            pp. 401-407 (USSR)

ABSTRACT: A method of forming the transmission functions of extra-
            polating devices is given here. It permits to use the
            existing theory of impulse control for an analysis and
            synthesis of systems containing these devices. The extra-
            polating devices serve for transforming the discreet data
            into continuous (or continuous in places) ones. The follo-
            wing is shown: 1) In the investigation of the dynamics
            of the control system with an impulse element, connected
            in series, with an infinitely small reciprocal of the pulse
            duty factor (skvazhnost') ($\gamma \rightarrow 0$) and an extrapolating de-
Card 1/2   vice these terms can be replaced by an impulse element

A Method of Forming Transmission Functions of
Sampled-Data Control Systems With Extrapolating Devices

which forms pulses of a rectangular shape and $\gamma = 1$, and
by the linear (continuous) part of the extrapolating de-
vice which is also connected in series. 2) The transmis-
sion function of the linear part of the extrapolating de-
vice can be found by the application of the usual (and not
discreet) Laplace transformation. This transmission function
only expresses the connection between the representation of
the input and the output quantity in the case of a certain
shape of the input action - in the case of a continuity of
the rectangular pulses with $\gamma = 1$. Therefore such a func-
tion can be called a conditional transmission function.
3) On the basis of the data given here it can be stated
that the method of the conditional transmission functions
(in the sense here mentioned) is applicable when the input
action represents a continuity of impulses of any previously
known shape.
There are 4 figures, 1 table and 4 references, all of which
are Soviet.

SUBMITTED: November 1, 1957
AVAILABLE: Library of Congress
Card 2/2

1. Mathematical computers—Operation   2. Mathematical computers—
Control

SOV/129-59-2-7/16

AUTHOR; Yermakov, S.S., Candidate of Technical Sciences

TITLE: Impact Fatigue of the Steel 30KhGS (Udarnaya
Strength
vynoslivost' stali 30KhGS)

PERIODICAL: Metallovedeniye i Termicheskaya Obrabotka Metallov,
1959, Nr 2, pp 34 - 36 (USSR)

ABSTRACT: The author investigated the influence of the tempering
temperature on the impact fatigue strength of 30KhGS steel
(0.32% C, 1.16% Mn, 1.20% Cr and 0.99% Si). The impact
fatigue was tested on a machine, a sketch of which is
strength
shown in Figure 1, in which a specimen with dimensions
as shown in Figure 2 was subjected to pure impact bending
(the load was applied simultaneously at two points with
impact energies of 25 and 60 kgcm) with a frequency of
600 impacts/min. After each impact, the specimen was
turned by 15°. Preliminary treatment of the specimens:
After machining, the specimens were quenched in oil from
880 °C, tempered in oil for 2 hours at 100, 200, 300, 400,
500, 600, 700 °C and, following that, cooled in air.
Three of the specimens were not tempered after hardening
and a further three were annealed at 880 °C for 2 hours.
Card1/3 Comparative fracture tests were made on a "Gagarin" press

Impact Fatigue/Strength of the Steel 30KhGS   SOV/129-59-2-7/16

and the impact strength was determined by means of a
pendulum impact-testing machine with an impact energy
of 30 kgm. The obtained results, graphed in Figure 3,
show that all the mechanical properties, i.e. strength,
impact strength, and impact fatigue strength increase
in the case of tempering at 200 °C. For tempering
temperatures above 200 °C, the strength and yield point
values drop.The impact strength drops sharply at tempering
temperatures from 200 to 500 °C. However, for a tempering
temperature of 500 °C, there is an increase in the
impact strength. In contrast to this, the impact fatigue
strength shows a second maximum at 400 °C when the impact
strength is lowest and at 500 °C the impact fatigue
strength drops sharply. In the case of impacts of
60 kgcm specimens tempered at 400 °C withstand the largest
number of impacts, whilst in the case of impacts with
energies of 25 kgcm, the specimens tempered at 200 °C
withstand the largest number of impacts. It was found
that for this steel, the fatigue strength in the case of
repeated impact loading has features which are not revealed
in static tests or in   single-impact bending tests.

Card2/3

Impact Fatigue/of the Steel 30KhGS   SOV/129-59-2-7/16

The fatigue curve for repeated impact loads, as a function of the tempering temperature, shows two maxima at 200 and 400 °C, respectively. The magnitudes of these maxima are determined by the energies of the individual impact. There are 3 figures and 4 references, 3 of which are Soviet and 1 German.

ASSOCIATION: Leningradskiy politekhnicheskiy institut
               (Leningrad Polytechnical Institute)

Card 3/3

SOV/129-59-6-9/15

AUTHORS: Vyaznikov, N.F., Yermakov, S.S., Candidates of
             Technical Sciences

TITLE: Residual Stresses in the Hardened and the Case-hardened
             Layer (Ostatochnyye napryazheniya v zakalennom tsemento-
             vannom sloye)

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1959,
             Nr 6, pp 41 - 45 (USSR)

ABSTRACT: The aim of the work described in this paper was to establish
             the influence of the steel composition and also of the depth
             and the structure of the carburized layer on the magnitude and
             the character of the distribution of the residual stresses in
             carburized components. The influence of alloying elements and
             of the carbon contents on the residual stresses in carburized
             and heat-treated specimens was investigated on alloy and carbon
             steels with compositions as given in the table on p 42. Cyl-
             indrical specimens of 12 mm dia, 150 mm length, were investi-
             gated after being carburized in a mixture of 85% charcoal, 10%
             sodium carbonate and 5% barium carbonate at 910-920 $^{\circ}$C for
             durations of 3-20 hours. Immediately after removal from the
             carburization boxes, the specimens were quenched in oil and
             quenched for a second time in oil from 780-800 $^{\circ}$C. Following
Card1/4   that, the specimens were tempered for 1 hour at 200 $^{\circ}$C and

Residual Stresses in the Hardened and the Case-hardened Layer

SOV/129-59-6-9/15

cooled in air. For one of the steels the specimens were sub-
jected to intermediate tempering at 660-680 °C for a duration of
4 hours prior to the second quenching. On the basis of the
obtained results, the following conclusions are arrived at.
1) The magnitude of the residual stresses and the character of
their distribution along the cross-section of the quenched,
carburized specimen depends on the depth of the carburized
layer, as well as on the chemical composition of the steel.
2) On increasing the depth of the carburised layer from
0.6-2.2 mm, the magnitude of the residual surface stresses
changes greatly. In the case of relatively shallow carburiz-
ation depths, there are compression stresses at the surface of
the specimens which increase with increasing depth of carburiz-
ation up to carburization depths of 1.2 mm. Further increase
of the carburization depth leads to a reduction in the compres-
sion stresses and in the case of carburization depths exceeding
2 mm, residual tensile stresses will be present at the
specimen surfaces.

Card2/4

SOV/129-59-6-9/15
Residual Stresses in the Hardened and the Case-hardened Layer

3) In accordance with the changes in the residual surface
stresses, there will also be changes in the magnitude and
the character of the stresses along the cross-section of
the carburized specimens. If the depth of carburization
does not exceed 1.2 mm, there will be a continuous change
in the residual stresses along the cross-section.
However, if the carburization depth exceeds 2 mm, the
curve representing the distribution of the
residual stresses will show a discontinuity in the
compression stresses.
4) The magnitude and the character of the residual
stresses are greatly dependent on the presence in the
structure of a hardened layer of excess carbides and
of residual austenite.

Card3/4

Residual Stresses in the Hardened and the Case-hardened Layer$^{SOV/129-59-6-9/15}$

There are 2 figures, 1 table and 3 Soviet references.

ASSOCIATION: Leningradskiy politekhnicheskiy institut
        (Leningrad Polytechnical Institute)

Card 4/4

SOV/32-25-3-30/62

25(6)
AUTHOR: Yermakov, S. S.

TITLE: Methods of Investigating Steel With Respect to Abrasion Under
            Alternating Shock-like Loads (Metodika issledovaniya stali na
            abrazivnyy iznos pri udarnoperemennykh nagruzkakh)

PERIODICAL: Zavodskaya Laboratoriya, 1959, Vol 25, Nr 3, pp 337-339 (USSR)

ABSTRACT: Methods have been worked out by which data on abrasion under
            alternating shock-like loads as a function of composition and
            structure of the abrasion layer can be obtained. Data for the
            steel types 20KhN2A, 20KhN3A, and 20N3MA (Table) were obtained
            by these methods. In principle, the test unit (Fig 1) is a
            spring which causes the loading. An electric motor rotates a
            shaft (700 rpm). Samples in the form of cog wheels (Fig 2) were
            tested; in this case the jolting effect (in addition to the ef-
            fect of friction caused by the rotation) was conveyed by the
            cogs. White electro-corundum (0.6-0.8 mm), corundum (3-5 mm),
            and quartz sand, in a liquid with a composition similar to sea
            water, were used as abrasion mixture. The samples were cemented
            into hard carburizing salt up to a layer thickness of 1.5-1.7 cm
            at 930 $\pm$ 10° and given a thermal aftertreatment of various

Card 1/2

Methods of Investigating Steel With Respect to Abrasion Under Alternating
Shock-like Loads

SOV/32-25-3-30/62

types. The results showed (Fig 3) that the thermal aftertreat-
ment, i.e. the microstructure of the layer considerably in-
fluences the degree of abrasion. 20N3MA steel was investigated
with regard to the influence of the load on the abrasion and it
was found that an increase of abrasion (it is doubled) almost does not
occur until the load has increased from 150 to 250 kg. The ab-
rasion of the steels tested depends on the structure and hard-
ness of the surface layer under stress. There are 3 figures,
1 table, and 2 Soviet references.

ASSOCIATION: Leningradskiy politekhnicheskiy institut im. M. I. Kalinina
(Leningrad Polytechnical Institute imeni M. I. Kalinin)

Card 2/2

YERMAKOV, JJ.

PHASE I BOOK EXPLOITATION   SOV/4024

Vyaznikov, Nikolay Filippovich, and Sergey Stepanovich Yermakov

Primeneniye izdeliy poroshkovoy metallurgii v promyshlennosti (Use of Powder-Metallurgy Products in Industry) Moscow, Mashgiz, 1960. 187 p. Errata slip inserted. 5,000 copies printed.

Reviewer: P.B. Mikhaylov-Mikheyev, Professor; Ed.: M.I. Koryukov, Docent, Candidate of Technical Sciences; Ed. of Publishing House: M.A. Chfas; Tech. Ed.: A.I. Kontorovich; Managing Ed. for Literature on Machinery Manufacturing (Leningrad Division, Mashgiz): Ye. P. Naumov, Engineer.

PURPOSE: This book is intended for technical personnel in machine and instrument manufacturing industries. It may also be useful to students at schools of higher technical education.

COVERAGE: The authors describe methods of producing powders from various ferrous and nonferrous metals and the manufacture of rare and refractory metals by powder metallurgy. The theory and methods of manufacturing powdered-metal products and the properties of such

Card 1/6

Use of Powder-Metallurgy Products in Industry   SOV/4024

products (friction and antifriction materials, carbides and heat-resistant alloys, filters, magnets and other machine parts,etc.) are presented. No personalities are mentioned. There are 83 references: 63 Soviet, 12 English, 7 German, and 1 Polish.

TABLE OF CONTENTS:

Card 2/6

78124
SOV/129-60-3-3/16

18.7500

AUTHORS: Vyaznikov, N. F., Yermakov, S. S., Soldatova, N. N.
Candidates of Technical Sciences)

TITLE: Case Hardening of Chromium Stainless Steel

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov,
1960, Nr 3, pp 11-13 (USSR)

ABSTRACT: This is a report concerning the determination of a
method of case hardening of steels 1Kh13 and
1Kh17, with the purpose of increasing the surface
hardness of products made from them. Low-chromium
stainless steel does not have a sufficient hardness
in hardened state and therfore cannot be used for
products subject to abrasion and compression wear,
etc. The chemical composition of investigated steels
is given in Table 1.

Card 1/4

Case Hardening of Chromium Stainless Steel   78124

SOV/129-60-3-3/16

Table 1.

DISTRIBUTION OF STEEL	CHEMICAL COMPOSITION OF STEEL				
	C	Si	Mn	Cr	Ni
1X13	0,12	0,75	0,86	13,3	0,20
1X17	0,10	0,80	0,90	18,0	0,80

Case hardening was done in a solid carburizing agent, containing 85% of birch charcoal, 10% of sodium carbonate, and 5% of barium carbonate. The 20 x 20 x 60 mm samples were packed in iron boxes, heated for 12 hr at 900°, 950°, 1,000°, and 1,050° C and cooled in the air. The hardness of samples, quenched from 1,000° C after case hardening for

Card 2/4

Case Hardening of Chromium Stainless Steel

78124
SOV/129-60-3-3/16

4-12 hr at various depths of case hardened layer,
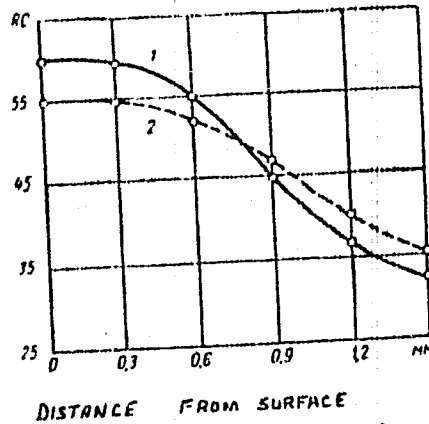is illustrated in Figure 1.

Fig. 1.   Hardness of samples, hardened from 1,000° C,
at various depths of case hardened layer: (1) steel
1Kh13; (2) steel 1Kh17.

Card 3/4

Case Hardening of Chromium Stainless Steel   78124
SOV/129-60-3-3/16

The conducted tests proved that the maximum hardness of stainless steel (without case hardening) after quenching from 1,000-1,500° C is not over 30 RC, while after case hardening it increases to 55-60 RC. The steel which was case hardened at 950° C differs very little (in hardness) from the steel case hardened at 1,000° C. Therefore, the authors recommend case hardening components made from stainless steels 1Kh13 and 1Kh17 at 950° C and quenching them from 1,000° C. There are 2 figures; and 5 tables.

ASSOCIATION: Leningrad Polytechnic Institute imeni M. I. Kalinin (Leningradskiy Politekhnicheskiy institut imeni M. I. Kalinina)

Card 4/4

YERMAKOV, S.S.; PRODAN, N.S.

Methods of measuring impact energy in testing metals for impact
endurance. Zav. lab. 27 no. 12:1513-1514 '61.   (MIRA 15:1)

1. Leningradskiy politekhnicheskiy institut im. M.I. Kalinina.
                (Metals—Testing)

S/810/62/000/000/012/013

AUTHOR: Yermakov, S.S.

TITLE: The wear and fatigue of steel under multiple shock loads while exposed
to an abrasive liquid medium.

SOURCE: Metallovedeniye i termicheskaya obrabotka; materialy konferentsii po
metallovedeniyu i termicheskoy obrabotke, soct. v g. Odesse v 1960 g.
Moscow, Metallurgizdat, 1962, 263-269.

TEXT: The paper describes a novel testing method and reports test results of
experimentation intended to investigate the problem of the rapid wear and failure
resulting from fatigue fissures in steel attributable to multiply repeated loads and
the action of an abrasive liquid medium on steels that ordinarily have elevated
resistance against abrasive wear, high strength, and good impact toughness. The
test equipment is shown in a schematic cross-section. In it a motor-driven rotat-
able vertical shaft is fitted at its lower end with a star-shaped assemble of 3 hori-
zontal idler shafts which serve as journals for spur-gear-shaped circular specimen
wheels. When the vertical shaft rotates, the gear-shaped specimen wheels roll in
a circular path over a cast-iron plate, and, owing to a downwardly exerted axial
spring load on the vertical shaft, the specimen wheels impose on their contact

Card 1/4

S/010/62/000/000/012/013

The wear and fatigue of steel under multiple ...

points with the cast-iron plate impact loads of predictable frequency and intensity. The impact-wear pair is contained in a circular bath filled with an abrasive liquid consisting of corundum and quartz sand. Inasmuch as the centrifugal force presses the gear-shaped specimens against their respective external retainer disks, and the interstice between them is also filled with the abrasive liquid, the experiment provides also information on the non-impact wear occurring in the abrasive liquid. Specimens made of steels 20XH2A (20KhN2A), 20XH3A (20KhN3A), and 20H3MA (20N3MA) were tested (mechanical properties are tabulated). Experiments for impact fatigue were performed by the pure-bending method of a rotating specimen supported as a simple beam and loaded with two spaced-apart concentrated normal loads; these tests were performed in air and in liquid corrosive media. The test equipment used is shown in cross-section. The specimens were subjected to cementation and heat treatment to increase their hardness and, hence, their abrasion resistance. Cementation was done in a solid carburizer at 930°C. Four different heat-treatment methods followed cementation: (1) Oil quench (OQ) after cementing, 2d OQ from 770°, and 2-hr temper at 180-300°; (2) 7-hr temper at 640°, intended to reduce the amount of retained austenite (RA) in the carburized layer, followed by Q and temper as in (1); (3) air cooling to 450-500° after cementation, then reheat to 830-850°, OQ, and 2-hr tempering 180-200°; (4) cooling in the carburizing box to 20°. Quench from 830-850° was performed to

Card 2/4

The wear and fatigue of steel under multiple ...   S/8.0/62/000/000/012/013

comminute the grain size and remove the carbide network; the lower-temperature 2d Q (720-740°) was intended to minimize the quantity of RA, whereupon the specimens were tempered for 2 hrs at 180-200°. Procedures (1) and (4) yielded a carburized-layer microstructure consisting of acicular martensite (M) with almost complete absence of RA; R_C 61-63. The other 2 methods did not eliminate all of the RA, and their hardness was lower. Impact fatigue of steels: The results of the determination of the impact-fatigue (IF) resistance (R) of specimens cemented to a depth of 1.6-1.8 mm and heated-treated in one of the 4 above-mentioned ways are tabulated. Steel 20N3MA, heat-treated according to method (1), in which the carburized layer contained RA in the form of finely dispersed, uniformly distributed inclusions, had the most favorable properties. Additional tests showed that an increase from 720 to 780° of the second Q improved the strength and plasticity of the carburized layer and the IFR of the specimen as well by increasing slightly the quantity of RA. Yet higher second-Q temperatures impaired the IFR of the steel by engendering appreciable growth of the M crystals. In the same steel it was found that an increase in carburized-layer thickness up to 0.3 of the total cross-sectional area of the specimen improved the IFR of the specimen, but a further increase in thickness reduces the IFR. The fatigue tests in a corrosive liquid medium were performed in a solution similar in composition

Card 3/4

The wear and fatigue of steel under multiple ...   S/810/62/000/000/012/013

to sea water, and a reduction in IFR was observed not only during long-term
(40-50 min) tests, but in short-term (20-40 min) tests as well. Abrasive wear of
steel: Minimal wear occurred with steels 20KhN3A and 20N3MA heat-treated
according to method (1). In summary, the best wear resistance under impact
loads was exhibited by steel having a microacicular M structure with a small
amount of uniformly distributed austenite. Under static loads, by contrast, the
wear increased in the presence of RA in the carburized layer. There are 9
figures and 2 tables; no references:

ASSOCIATION: Leningradskiy politekhnicheskiy institut im. M. I. Kalinina
                (Leningrad Polytechnical Institute imeni M. I. Kalinin).

Card 4/4

ACC NR: AT7004519   (A)   SOURCE CODE: UR/2563/66/000/268/0041/0046

AUTHOR: Yermakov, S. S.; Dobrovatova, N. S.

ORG: Leningrad Polytechnical Institute (Leningradskiy politekhnicheskiy institut)

TITLE: Effect of alloying additions on the properties of iron-base powder metallurgy materials

SOURCE: Leningrad. Politekhnicheskiy institut. Trudy, no. 268, 1966. Metallovedeniye (Metal science), 41-46

TOPIC TAGS: powder metallurgy, iron alloy, graphite, copper containing alloy, nickel containing alloy, powder metal sintering, metallographic examination, impact resistance

ABSTRACT: A study was done on iron-base powder metallurgy materials composed of 94 to 99% iron alloyed with nickel, copper, and graphite. Seven mixtures were made: (1,2) graphite alone--1.0 and 3.0%; (3) graphite--1.0%, Cu--3.0%; (4) graphite--3.0%, Cu--3.0%; (5) graphite--1.0%, Ni--3.0%; (6) graphite--3.0%, Ni--3.0%; and (7) graphite--3.0%, Cu--1.5%, Ni--1.5%. Shrinkage and density were given as functions of composition and compacting. Microstructures and mechanical properties were determined on the finished products. Before compacting, the powder mixtures were deoxidized and sifted through a screen. Cylindrical samples of 18 mm height and 10 mm diameter

Card 1/2

ACC NR: AT7004519

were compacted at pressures of 7-12 T/cm^2 and sintered for 2 hrs at temperatures of
1050, 1100, and 1150°C in dissociated ammonia. Cracking occurred above 10 T/cm^2 so
for optimum compacting the pressure was kept at 9-10 T/cm^2 resulting in a residual
porosity of 14-18%. The sintered density increased as a function of temperature and
became constant at 1100°C; however, at 1150°C the macro- and microstructures were more
uniform. Ferrite formed for mixtures #1 and #2, while pearlite + cementite develop-
ed for the others. For #7 a liquid Cu-Ni solution formed during sintering, giving a
compact peralitic structure with a thin network of cementite. After homogenizing for
2 hrs at 800°C the cementite network dissolved. Maximum hardness was obtained after
sintering at 1150°C. Mixture #3 had the highest hardness at 87 R_B. The shrinkage
after sintering for 2 hrs at 1150°C was given for each mixture. Mixtures #5, #6,
and #7 had the largest volume changes--4, 5, and 6% respectively. The samples were
water quenched from 800, 825, and 850°C and tempered for 2 hrs at 180°C. Microstruc-
tures and mechanical properties of the heat treated samples showed that every mix-
ture had an optimum quenching temperature. No hardness differences were observed be-
tween 1 and 3% graphite. Quenching increased the bending strength, but decreased
the impact resistance. The impact resistance, compressive and bending strength de-
creased after the carbon content increased from 1 to 3%. It was concluded that Cu
and Ni increased the mechanical properties of iron-base powder metallurgy materials.
Orig. art. has: 3 figures, 2 tables.

SUB CODE: 11/   SUBM DATE: none

Card 2/2

IERMAKCV, S.S.

Abrasive resistance of tool steel under the effect of repeated
shock loading in liquid media conditions. Trudy LPI no.234:83-
88 '64.   (MIRA 17:11)

YERMAKOV, S.S.
Powder friction material for computer coupling disks. Trudy
LPI no. 251:82-86 '65
(MIRA 19:1)

83276

S/109/60/005/009/026/026
E140/E455

26.1632
9.3120

AUTHORS: Bondarenko, B.V., Yermakov, S.V. and Tsarev, B.M.

TITLE: Thermionic Properties of Alkali-Earth Metal Tantalates

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol.5, No.9, pp.1553-1555

TEXT: This is a continuation of earlier work (Ref.1) in which basic barium tantalate was found to have higher emission properties than barium tungstate.   A table of the 22 compounds studied is given on p.1555.   It is found that basic barium tantalate has higher emissivity than basic barium tungstate but is less stable thermally.   Its limiting temperature is therefore 1500°K, as compared with 1700 to 1800°K for the latter compound.   There are 3 figures, 2 tables and 3 Soviet references.

SUBMITTED: April 1, 1960

Card 1/1

29327
S/109/61/006/010/026/027
D201/D3??

26. 2532

AUTHORS: Bondarenko, B.V., Yermakov, S.V., and Tsarev, B.M.

TITLE: Thermo-electric properties of barium hafnates and perrhenates

PERIODICAL: Radiotekhnika i elektronika, v. 6, no. 10, 1961, 1773 - 1775

TEXT: In conjunction with the results of study of thermo-electric properties of barium tantalates by B.V. Bondarenko, Ye.P. Ostapchenko, and B.M. Tsarev, (Ref. 1: Radiotekhnika i elektronika, 1960, 5, 8, 1246) which were shown to be slightly better than those of barium tungstanate, the authors give the results of their determining thermo-electric properties of barium hafnates of type $(BaO)_n (HfO_2)_m$ with $n : m = 2 : 1; 3 : 1; 5 : 1; 7 : 1$ and of barium perrhenates $(BaO)_n (Re_2O_7)_m$ with $n : m = 1 : 2; 2 : 1; 3 : 1; 5 : 1; 7 : 1;$ The study of barium hafnates and rhenates with different content of barium oxide was required to determine the influence of barium oxide on the thermoelectric properties of complex oxi-

Card 1/3

Thermo-electric properties of ...

29327
S/109/61/006/010/026/0?7
D201/D302

des and to find the composition of oxides which would be stable in vacuum at operating temperatures. A tungsten tape, cleaned by heating in vacuo, was used as the base. The temperature was being determined by a tungsten iridium thermo-couple. The process of activation of cathode consisted of prolonged heating with the outflow of emission current, starting with the temperature corresponding to a low emission $10^{-8} - 10^{-7}$ ampere^2 and ending at the temperature beyond which the emission started to fall due to the increases work function φ. After the activation has been finished, the emission was measured within a wide range of temperatures after increasing it and decreasing until a stable and reproducible emission current was obtained. All analyzed substances had a minimum of the work function, corresponding to that of a simple model of an n-type semiconductor. The thermoelectric properties of barium hafnates and rhenates as obtained in the experiment are given in tabulated form. The results obtained show that as compared with those of tungstenates and even tantelates of barium, the rhenates, and in particular hafnates of barium have somewhat better emission properties. It is stated in conclusion, however, that until the above substances can

Card 2/3

29327
S/109/61/006/010/026/027
D201/D302

Thermo-electric properties of ...

be recommended for use in thermal emission cathodes, further inves-
tigations into their evaporating and thermal stability properties
have to be carried out. There are 1 table, 2 figures and 1 Soviet-
bloc reference.

SUBMITTED: June 15, 1960

Card 3/3

44198
S/109/62/007/012/020/021
D271/D308

9,3120
26.1640

AUTHORS: Bondarenko, B. V. and Yermakov, S. V.

TITLE: Thermionic properties of carbides of metals belonging to groups IV and V

PERIODICAL: Radiotekhnika i elektronika, v. 7, no. 12, 1962, 2099-2101

TEXT: Measurements of thermionic emission of some metal carbides are reported. Experimental diodes had cathodes of W tape with a thin film of investigated carbide on one side and a thermocouple on the other side, and Ta anodes. The effective work function was determined from measured values of temperature and emission current density. A linear dependence of work function on temperature was found in the temperature range investigated. The following values of the work function $\varphi_E = \varphi_0 + \frac{\partial \varphi}{\partial T} T$ eV are tabulated: TiC: $3.46 + 2.10^{-4}$ T (1300 - 1750°K) and $3.6 + 1.10^{-4}$ T (1750 - 2200°K),

Card 1/2

S/109/62/007/012/020/021
D271/D308

· Thermionic properties of ...

ZrC: $3.24 + 2.10^{-4}$ T, HfC: $3.42 + 1.75.10^{-4}$ T, VC: 3.85, practically invariable in the range of $1300 - 2100^{\circ}$K, NbC: $4.1 - 2.5.10^{-4}$ T, TaC: $3.98 - 1.5.10^{-4}$ T. Work function values at 300°K, 1400°K and 2000°K are also tabulated, as well as the carrier concentration at 2000°K. The sign of the temperature coefficient of the work function depends on the character of doping centers: donor in metal carbides of IV group and acceptor in V group. Zr and Nb carbides are the most promising for use in thermionic cathodes. Current density of 3.6 A/cm^2 was obtained for NbC at 2000°K. There are 3 figures and 2 tables.

-· SUBMITTED: May 25, 1962

Card 2/2

-44199

9.3120
26.1640

AUTHOR: Yermakov, S. V. and Tsarev, B. M.

TITLE: Thermionic emission of silicides of metals belonging to transitional groups of the periodic system of elements

TEXT: Measurements of thermionic emission of disilicides of 8 metals are reported and discussed. Silicides were placed on a W-tape, occupying a predetermined section, and a thermocouple was welded to the other side of the tape. The value of effective work function was determined from measurements of temperature and current density. The following values of $\varphi_E = \varphi_0 + \frac{d\varphi}{dT}T$ in eV are tabulated: $ReSi_2$: 4.02 − 2.67.10^{-4} T (1200 − 1900°K), WSi_2: 4.04 − 4.67.10^{-4} T (1200 − 1800°K), $TaSi_2$: 4.42 − 3.8.10^{-4} T (1400 − 1900°K), $MoSi_2$: 4.02 −

Card 1/2

S/109/62/007/012/021/021
D271/D308

Thermionic emission of ...

$5.10.10^{-4}$ T (1100 - 1800°K), $NbSi_2$: 4.34 - $5.25.10^{-4}$ T (1300 - 1700° K), $ZeSi_2$: 3.95 - $5.10.10^{-4}$ T (1200 - 1900°K), VSi_2: 3.26 - $7.5.10^{-5}$ T (1100 - 1600°K), CrSi : 3.49 - $5.8.10^{-5}$ (1200 - 1400°K), Cr_3Si: 2.35 + $6.33.10^{-4}$ T (1100 - 1400°K), $CrSi_2$: 3.78 - $1.2.10^{-4}$ T (1200 - 1450°K). Values of the work function at 300 and 1400°K are also given. Some silicides have displayed a fairly strong activation at the beginning of temperature process, but the work function noticeably rises above a certain temperature, up to the limit of the temperature range. Nb silicides have shown activation in the entire range studied. V, Ta, Cr silicides remained in the state of stabilized activity. Formation of SiO_2 film which evaporates at higher temperatures is suggested as an explanation of the observed variations of activity. There are 2 figures.

Card 2/2

S/0109/64/009/001/0180/0181

ACCESSION NR: AP4009992

AUTHOR: Yermakov, S. V.

TITLE: Thermionic emission of thulium hexaboride

SOURCE: Radiotekhnika i elektronika, v. 9, no. 1, 1964, 180-181

TOPIC TAGS: electron emission, thermionic emission, thulium hexaboride, thermocathode, thulium hexaboride emission

ABSTRACT: As no data on the thermionic emission of TmB_6 was known to the author, this substance was tested for thermionic emission. Measurements were made both in sealed tubes (at 10^{-7} torr or better) and in a vacuum device with continuous exhaustion (at 10^{-5} torr). Experimental data on the effective work function, at $A_0 = 12$ acm^{-2} degree^{-2}, and current density for a W tape coated with TmB_6 and for a tape pre-coated with MV-30 alloy or with TaC, for temperatures 1,100-1,800K, are tabulated. It was found that TmB_6 has a

Card 1/2

ACCESSION NR: AP4009992

positive temperature coefficient of 3.3×10^{-4} ev/deg and that at 1,800K, it
vaporizes violently. "In conclusion, the author feels it his duty to thank G. V.
Samsonov for his specimen of thallium hexaboride." Orig. art. has: 1 figure,
1 formula, and 1 table.

ASSOCIATION: none

SUBMITTED: 11Jul63   DATE ACQ: 10Feb64   ENCL: 00

SUB CODE: GE   NO REF SOV: 002   OTHER: 000

Card 2/2

L 06976-67   EWT(1)/EWP(e)/EWT(m)/EWP(w)/EWP(t)/ETI/EWP(k)   IJP(c)   JD/JG/AI
ACC NR: AP6018361   SOURCE CODE: UR/0089/66/020/005/0439/0440

AUTHOR: Yermakov, S. V.; Tsarev, B. M.

ORG: none

TITLE: Thermionic emission of uranium dodecaboride

SOURCE: Atomnaya energiya, v. 20, no. 5, 1966, 439-440

TOPIC TAGS: uranium compound, tungsten, thermionic emission, work function

ABSTRACT: The thermionic emission of uranium dodecaboride was measured by a pro-
cedure described earlier (Radiotekhnika i elektronika v. 7, 2099, 1962). The sub-
strate was a tungsten ribbon, on which a thin layer (30 -- 50) of a dense sus-
pension of U 12 powder in metal alcohol was deposited. As in the case of hexaboride
of rare earth metals, UB_{12} reacts with the tungsten, causing the latter to curl,
and causing metallic uranium to be deposited on the walls of the bulb. The work
function was determined from the measured values of the temperature and current
density and is found to satisfy the equation $2.89 + 2.3 \times 10^{-4}$ T. Deviations from a
linear dependence, towards lower values of the work function, are observed at 1500
-- 1900 K and are probably due to the start of noticeable reaction between UB_{12} and

UDC: 621.032.273:546.791 + 546.271

Card 1/2

L 06976-67

ACC NR: AP6018361

the tungsten. The region above 1900 K could not be investigated because the limit of the anode current was reached. Attempts to cover the UB_{12} film with iridium powder were also unsuccessful. Comparison with the data on UB_4 and UB_2 indicate that the deviation from linearity at high temperatures can be attributed to gradual transformation of UB_{12} into UB_4 and then UB_2. The authors thank Yu. B. Paderno and G. V. Samson for supplying the sample of uranium dedecaboride. Orig. art. has: 2 tables and 1 formula.

SUB CODE: 18   SUBM DATE: 01Oct65/   ORIG REF: 003   OTH REF: 001

Card 2/2

YERMAKOV, T.G.

Electrification of the East Siberian line. Zhel.dor.transp.
43 no.3:12-17 Mr '61.   (MIRA 14:3)

1. Nachal'nik Vostochno-Sibirskoy dorogi, g. Irkutsk.
        (Siberia, East—Railroads—Electrification)

J

USSR/Soil Science - Tillage. Amelioration. Erosion.

Abs Jour   : Ref Zhur Biol., No 1, 1959, 1410

Author   : Yermakov, V.
Inst   :
Title   : Treatment of Alkaline Soils in Kurganskaya Oblast'

Orig Pub   : S. kh. Sibiri, 1958, No 1, 19-23

Abstract   : No abstract.

Card 1/1

YERMAKOV, V.

Separators which function without failure. Mast ugl. 3 no.6:22
Je '54.
(MLRA 7:7)

1. Nachal'nik ugleobogatitel'noy fabriki shakhty No. 29 kombinata.
   (Coal mining machinery)

YERMAKOV, V.

Improving the safety valve. Avt. transp. 39 no.5:53 My '61.
(MIRA 14:5)

(Air brakes)

YERMAKOV, V.

Device for dismantling bearings. Av.transp. 40 no.7:52 Jl
'62.   (MIRA 15:8)

(Garages—Equipment and supplies)

BARANOVA, G.; BRANDSHTETR, I.; DRUIN, V.; YERMAKOV, V.; ZVAROVA, T.;
KRZHIVANEK, M.; MALY, Ya.; POLIKANOV, S.; SU KHUN-GUY
[Su Hung-kuei]

[Production of Md^{256} through irradiation of U^{238} with Ne^{22} ions,
study of some of its chemical properties] Poluchenie Md^{256} pri
obluchenii U^{238} ionami Ne^{22} i izuchenie ego nekotorykh khimi-
cheskikh svoistv. Dubna, Ob"edinennyi in-t iadernykh issl., 1962.
11 p.

(MIRA 15:1)

(Mendelevium) (Uranium) (Neon)

YERMAKOV, V., podpolkovnik

    Rates of crossing can be increased. Tekh. i vooruzh. no.3:52-53
                                       (MIRA 17:8)
Mr '64.

YERMAKOV, V.

Heater operating with various fuels. Pozh.delo 7 no.12:15 D
'61.   (MIRA 14:11)

1. Nachal'nik pozharno-isrytatel'noy stantsii, Krasnoyarsk.
                    (Stoves)

KULIKOV, D.; YERMAKOV, V.

Use of tanks in fire extinction. Pozh.delo 9 no.10:18-19 O '63.
(MIRA 16:12)

BERANOVA, H.; BRANDSHTETR, I.; DRUIN, V.; YERMAKOV, V.; ZVAROVA, T.;
KZHIVANEK, M. (Krzywánek, M.); MALY, Ya. (Malý, J.); POLIKANOV, S.;
SU HUNG-KUEI

Synthesis of 256 Md as a result of irradiating ^{238} U with
22 Ne ions and research on some of its chemical properties.
Nukleonika 7 no.7/8:465-471 '62.

1. Ob"yedinennyy institut yadernykh issledovaniy, Dubna, Laboratoriya
yadernykh reaktsiy.

L 7868-66

ACC NR: AP5017031

SOURCE CODE: UR/0209/65/000/007/0024/0028

AUTHOR: Yermakov, V. (Colonel; Military pilot first class; Docent; Candidate of military sciences); Petrukhin, P. (Engineer; Lieutenant colonel)

ORG: none

TITLE: Search for targets of opportunity

SOURCE: Aviatsiya i kosmonavtika, no. 7, 1965, 24-28

TOPIC TAGS: target recognition, air force tactic, aerial reconnaissance, bombing tactic, target discrimination, target acquisition, detection probability

ABSTRACT: In an article based on tactical training experience acquired in aviation units, two military experts discuss sweep and destroy techniques. A search for targets of opportunity may be executed either by a linear or by a grid sweep maneuver, as necessitated by the tactical situation. The two-seater aircraft is superior to the single-seat aircraft in this application since it has an increased search area and a large overlap zone (see Fig. 1). With the use of a pair of two-seater aircraft (see Fig. 2),
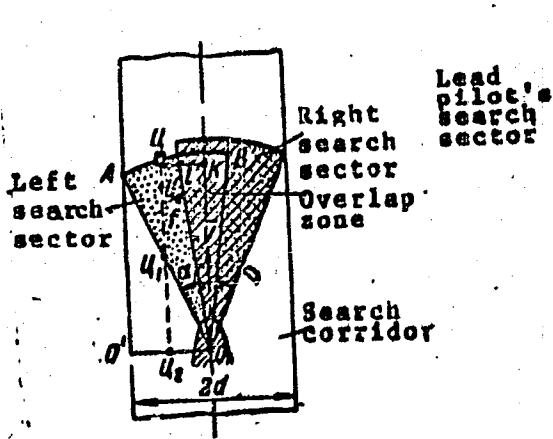
Card 1/4

L 7868-66

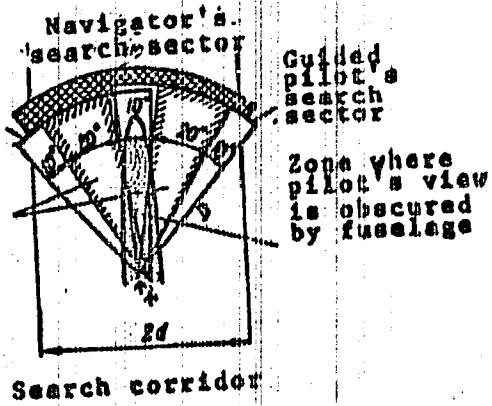**Fig. 1.** Search corridor of a single two-seater aircraft

Fig. 2. Search corridor of a pair of two-seater aircraft

Card 2/4

L 7868-66
ACC NR: AP5017031

the conditions for conducting a search are still more favorable, since near the secondary-overlap sector there appears a tertiary-overlap sector. This occurs as a result of the superposition upon each other of the search sectors of the leading and the following aircraft and the zones covered by the navigators.

The area which must be inspected in order to search out and destroy a target may be determined by the formula

$$S = 0.00873 \; V_t^2 \cdot T^2 \cdot \alpha^o.$$

where T is the time plotted from the moment the target is detected to the moment the bomber reaches this area, and V_t is the speed required for the target to cover the distance, assuming that immediately after the target's detection it enters into sector α^o.

The probability P of a single crew detecting a target can be determined by the formula

$$P = 1 - e^{-\lambda \cdot S(1-K_w)}.$$

Card   3/4

L 2868-66

ACC NR: AP5017031

where S is the area searched by the crew, λ_1 is the target density per area, K_m is the target-camouflage coefficient ($K_m = 0$ for targets which contrast with the landscape, and $K_m = 1$ for a target which cannot be distinguished from the landscape). If n crews are conducting the search, each of which is observing the area S, and the areas do not overlap, the probability of detecting a single target can be expressed by

$$P = 1 - e^{-\lambda_1 \cdot S (1 - K_m)^n} .$$

To insure the effectiveness of the search, an optimal search area per aircraft must be assigned. This can be determined from the nomogram in Fig. 3, using

$$\lambda_1 = \frac{N_t}{ab} ; \quad \lambda_2 = \frac{N_b}{ab} ,$$

where N_t is the number of targets, N_b is the number of antiaircraft guided-missile batteries, a & b are the dimensions of the operational theater (frontal and in depth), and W is the hit probability. Orig. art. has: 6 figures. [ATD Press: 4138-F]

SUB CODE: 15, 17 / SUBM DATE: none

Card 4/4