

On the problem of the existence...

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where  $M = \max |b_{ij}(t)|$ ,  $t_0 \leq t \leq T$ .

Lemma 1.2: If  $u^{(k)}(t)$  is a minimizing sequence of (1.1) then the sequence  $x(x_0, t_0, u^{(k)}(t), t)$  contains at least one uniformly convergent subsequence  $x^{(k_1)}(t) = x(x_0, t_0, u^{(k_1)}(t), t)$ ,  $t_0 \leq t \leq t_0 + T$ .

Let

$$\frac{d\tilde{\delta}x}{dt} = P^{(k)}(t)\tilde{\delta}x + B(t)\delta u(t) + O(\tilde{\delta}x, t), \quad k=0, 1, \dots, \quad (1.3)$$

be the equation of the disturbed motion for (1.1) for a variation of the control  $\delta u(t)$ , and let

$$\frac{d\delta x}{dt} = P^{(k)}(t)\delta x + B(t)\delta u(t), \quad k=0, 1, \dots, \quad (1.4) \quad \checkmark$$

be the linear approximation of (1.3). If  $\tilde{\delta}u(t) = \delta u^{(k)}(t)$  then for the corresponding solutions  $\tilde{\delta}x^{(k)}(t)$  and  $\delta x^{(k)}(t)$  of (1.3) and (1.4) it holds:

Lemma 1.3: The solutions of the systems (1.3) and (1.4) satisfy the inequality

$$|\tilde{\delta}x_i^{(k)}(t) - \delta x_i^{(k)}(t)| \leq \phi(\varepsilon), \quad k=1, 2, \dots,$$

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where  $t_0 \leq t \leq \tau$ ,

$$\varepsilon = \int_{t_0}^{\tau} \sum_{j=1}^r |\delta \dot{u}_j^{(k)}(t)| dt \quad \text{and} \quad \frac{\Phi(\varepsilon)}{\varepsilon} \rightarrow 0 \quad \text{for} \quad \varepsilon \rightarrow 0.$$

Then the author considers the equation

$$\frac{dx(t)}{dt} = P^{(k)}(t)x(t) + B(t)w(t), \quad k=0,1,\dots, \quad (2.1) \quad \checkmark$$

where the elements of the matrix  $P^{(k)}(t)$  are equal to the functions  $\frac{\partial f_1}{\partial x_1}$  calculated along the curves  $x^{(k)}(t)$  ( $x^{(k)}(t) \rightarrow x^0(t)$  uniformly for  $k \rightarrow \infty$ ). Let  $B_j(t)$  denote the  $j$ -th column of  $B$ . Let  $F^{(k)}(t)$  be the fundamental matrix of (2.1) for  $B(t) \equiv 0$ . Let  $(l \cdot [F^{(k)}(t)B_j(t)])$  denote the scalar product of the vector  $l$  and the vector  $F^{(k)}(t)B_j(t)$ . By use of earlier results of the author and others now the trajectories

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of (2.1) are investigated in detail. The final result of these investigations is contained in the

Theorem: If for the equation (1.1) the coordinate origin is reached in the time  $T$ , for a control  $u^{(1)}(t)$ , and if the equations of the linear approximation (1.4) satisfy the conditions

$$(1 \cdot [F_{(k)}^{-1}(t)B_j(t)]_j) = 0, \quad \sum_{i=1}^n l_i^2 \neq 0, \quad j=1, \dots, r, \quad k=0, 1, \dots, \quad (2.2)$$

in the region  $|x_1(t)| \leq nr^2 MNT, e^{nLT}, (M = \max |b_{ij}(t)|, t_0 \leq t \leq t_0 + T)$  then there exists at least one optimal control being a piecewise constant function and determined by the formulas

$$u_j^0(t) = N \operatorname{sign}(l^0 \cdot [F_0^{-1}(t)B_j(t)]), \quad (l^0 \cdot z_0) = -1, \quad j=2, \dots, r, \quad (2.6)$$

where the vector  $l^0$  is found from the condition

$$\min_{l^0} \int_{t_0}^{t_0+T} \sum_{j=1}^r [(l^0 \cdot [F_0^{-1}(t)B_j(t)])]^2 dt, \quad (l^0 \cdot z_0) = -1.$$

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The author mentions L.S.Pontryagin. She thanks N.N.Krasovskiy for the theme and the leading of the work. There are 11 Soviet-bloc references.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S.M.Kirova (Ural Polytechnical Institute im. S.M.Kirov)

SUBMITTED: January 29, 1959

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26729  
S/040/61/025/003/006/026  
D208/D304

16.8000 (112,1344)

AUTHOR: Kirillova, F.M. (Sverdlovsk)

TITLE: On the problem of the analytic construction of regulators

PERIODICAL: Akademiya nauk SSR. Otdeleniye tekhnicheskikh nauk. Prikladnaya matematika i mekhanika, v. 25, no. 3, 1961, 432 - 439

TEXT: The regulator system is written in the form

$$\frac{dx_k}{dt} = \sum_{j=1}^n a_{kj}x_j + b_k u \quad (k=1, \dots, n) \tag{1.1}$$

where  $x_k$  are the phase coordinates,  $a_{kj}$ ,  $b_k$  are parameters,  $u$  is the controlling influence produced in the regulator. In the matrix form (1.1) is  $\frac{dx}{dt} = Ax + bu$ . At time  $t = 0$ ,  $x = x_0$ . The optimum cri-  
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teria may be obtained from

$$J(u) = \int_0^{\infty} V(u) dt, \quad (V(u) = \sum_{k=1}^n a_k x_k^2 + cu^2) \quad (1.2)$$

It is necessary to express the control, as a function of the coordinates  $x_1, \dots, x_n$ . The question of the existence of a possible control for the system (1.1) is considered. The function  $u(t)$  denotes a possible control if  $u(t)$  satisfies the inequality  $J(u) \leq \alpha$ . If  $B$  is an  $n \cdot n$  matrix and  $c$  an  $n$ -dimensional vector then  $(Bc)_i$  denotes the  $n$ -th component of their product.  $(a \cdot b)$  denotes the scalar product of vectors  $a$  and  $b$ . It is supposed that the vectors  $b, Ab, \dots, A^{n-1}b$  (2.1) are linearly independent. For a fixed point  $x_0$  there exists a number  $N(x_0, t)$  such that

$$\min_{(t-x_0) \leq -1} \int_0^t (l \cdot F^{-1}(\tau) b)^2 d\tau > \frac{1}{N^2(x_0, t)}, \quad \sum_{i=1}^n l_i^2 \neq 0$$

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where  $F(\tau)$  is the fundamental matrix of (1.1) with  $u \equiv 0$ . This implies the existence of a control  $u(\tau)$  which, with the origin at

$$\tau = t \text{ gives } \int_0^t u_1^2(\tau) d\tau \leq \frac{1}{N^2(x_0, t)} \cdot u^*(\tau) = \begin{cases} u_1(\tau) & (0 < \tau \leq t) \\ 0 & (t < \tau) \end{cases}$$

is then a possible control. If there are only  $k$  linearly independent vectors, when supposing, without loss of generality that these are the first  $k$ , the set of vectors

$$b, Ab, \dots, A^{k-1}b \tag{2.2}$$

is completed by vectors  $c^{(1)}, \dots, c^{(n)}$  ( $i = k+1, \dots, n$ ) so that the vectors  $b, Ab, \dots, A^{k-1}b, c^{(k+1)}, \dots, c^{(n)}$  form a basis. The substitution is made  $x = Dy$ , where

$$D = \begin{vmatrix} b_1 & (Ab)_1 & \dots & (A^{k-1}b)_1 & c_1^{(k+1)} & \dots & c_1^{(n)} \\ \dots & \dots & \dots & \dots & \dots & \dots & \dots \\ b_n & (Ab)_n & \dots & (A^{k-1}b)_n & c_n^{(k+1)} & \dots & c_n^{(n)} \end{vmatrix}$$

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If  $A^k b$  may be written

$$A^k b = \mu_0 b + \mu_1 A b + \dots + \mu_{k-1} A^{k-1} b, \sum_{i=0}^{k-1} \mu_i^2 \neq 0$$

then if  $A_1$  is the matrix

$$A_1 = \begin{bmatrix} 0 & 0 & \dots & \mu_0 \\ 1 & 0 & \dots & \mu_1 \\ \dots & \dots & \dots & \dots \\ 0 & 0 & \dots & \mu_{k-1} \end{bmatrix}$$

and  $b^*$  is the  $k$ -dimensional vector  $(1, 0, \dots, 0)$  then

$$b^*, A_1 b^*, \dots, A_1^{k-1} b^* \tag{2.4}$$

are linearly independent, i.e. for each point of the sub-space  $\{y_1, \dots, y_k\}$  there exists a possible control. If the roots  $\lambda_1$  of

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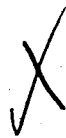
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the characteristic control of the matrix

$$\begin{vmatrix} \alpha_{k+1, k+1} & \dots & \alpha_{k+1, n} \\ \dots & \dots & \dots \\ \alpha_{n, k+1} & \dots & \alpha_{nn} \end{vmatrix} \quad (2.5)$$

satisfy  $\text{Re } \lambda_i < 0$  ( $i = 1, \dots, n - k$ ) (2.6) then for (1.1) a possible control may be constructed. In the case of the linear independence of (2.4) for every point  $(y_1^0, \dots, y_k^0)$  of the sub-space  $\{y_1, \dots, y_k\}$  a possible control  $u^*(\tau)$  may be constructed. If  $\lim_{t \rightarrow \infty} y_i = 0$  ( $i = k+1, \dots, n$ ) as  $t \rightarrow \infty$ , then  $u^*(\tau)$  is also a possible control for  $(y_1^0, \dots, y_k^0, y_{k+1}, \dots, y_n)$ . If only  $m$  roots of (2.5) satisfy (2.6), then the set of initial conditions of (1.1), for which there exists a possible control is a  $k+m$ -dimensional sub-space. It is shown, however, that in this case also  $u^*(\tau)$  is a possible control. The following assertions are made: If a possible



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control exists for any initial state of the system (1.1) then either the vectors (2.1) are linearly independent, or else for some  $k$  in the vectors (2.2) are linearly independent and the matrix (2.5) satisfies (2.6); If the set of initial conditions for which it is possible to construct a possible control comprise a  $k$ -dimensional sub-space, then either the vectors (2.2) are linearly independent and the roots of (2.5) satisfy  $P_{i_1} > 0$  ( $i = 1, \dots, n - k$ ) or else among the vectors (2.2) only  $k_1$  are linearly independent ( $k_1 < k$ ) and  $k - k_1$  roots of (2.5) are related in some way.

It may be shown that for a possible control  $u^*(\tau)$  expressed as a function of time, there exists a possible control expressed as a function of the coordinate system, i.e.  $u^*(\tau) = u(x(\tau))$ . The following is stated and proved: Theorem 3.1.: If for a space  $G_0$  of initial conditions  $x_0$  there exists a possible control  $u(x)$ , then for  $G_0$  there also exists an optimum control  $u_0(x)$  which has the

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form  $u_0(x) = p_1 x_1 + \dots + p_n x_n$  (3.1) where the  $p_i$  are constants for the system. In conclusion, the author thanks N.N. Krasovskiy for his advice. There are 4 references: 3 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: R. Bellman, Dynamic Programming, Princeton University Press, 1957.

SUBMITTED: March 13, 1961

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S/140/62/000/003/003/007  
C111/C333AUTHOR: Kirillova, F. M.

TITLE: Some questions on the theory of optimal control

PERIODICAL: Vysshiyе uchebnyye zavedeniya. Izvestiya. Matematika,  
no. 3, 1962, 48-58TEXT: The control  $u = (u_1, u_2, \dots, u_n)$  and the corresponding  
solution  $x = (x_1, x_2, \dots, x_n)$  of the system

$$\frac{dx}{dt} = f(x, t) + B(t, c) u(t) \quad (1.1)$$

are considered optimal, if the solution  $x$  starting from a given initial position reaches the origin of the system in the shortest possible time. Assuming that: a)  $f(x, t)$  is continuous in  $t$  and is continuously differentiable with respect to  $x_i$ ;  $\frac{\partial f}{\partial x_i}$  are bounded; b) the  $n \times n$  matrix  $B(t, c)$  is not singular, its elements  $b_{ij}$  are continuous in  $t$  and  $c$ ;

c) (1.2)  $\sum_{j=1}^n u_j^2(\tau) \leq 1$  almost everywhere on  $t_0 \leq \tau \leq t$ ; d) the

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parameter  $c$  has a fixed value; it is then proven that if there exists a solution to (1.1) with a given initial condition for  $t = t_0$  which reaches the origin of the coordinate system in the shortest possible time, then there exists at least one optimal solution to (1.1), and the corresponding control  $u$  is a continuous function. Then the system

$$\frac{dx}{dt} = f(x, t) + b(t) u(t) \quad (2.1)$$

is considered, where  $b = (b_1, \dots, b_n)$  and  $b_1(t) = b_{11}(t, 0)$  with the control restriction

$$\max |u_1(\tau)| \leq 1, \quad t_0 \leq \tau \leq t \quad (2.2)$$

Assuming that  $b_{11}(t, c) \rightarrow b_1(t)$ ,  $b_{1j}(t, c) \rightarrow 0$  ( $j = 2, \dots$ ) uniformly in  $t$  for  $c \rightarrow 0$ , it is shown that the solution of the optimizing problem (2.1), (2.2) can be obtained from the solution of (1.1), (1.2) by passing to the limit. The proofs are based on the construction of minimizing

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sequences  $u^{(k)}$  and on the consideration of the point sets of the phase  
space from which the origin can be reached in certain time intervals  
which are bounded from above.

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C111/C333

ASSOCIATION: Ural'skiy politekhnicheskii institut (Ural Polytechnic  
Institute)

SUBMITTED: June 6, 1959

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16.8000

37019  
S/044/62/000/003/080/092  
C111/C333AUTHOR: Kirillova, F.M.

TITLE: On optimal control processes

PERIODICAL: Referativnyy zhurnal., Matematika, no. 3, 1962, 56 - 57,  
abstract 3 V 299. ("Tr. Ural'skogo politekhn. in-ta", 1961,  
ab. 113, 35 - 44)

TEXT: For the system

$$\frac{dx}{dt} = X(x,t) + B(t) u(t)$$

there is sought a control  $u$  optimal relative to the velocity. Here  $x(t) = (x_1(t), \dots, x_n(t))$  is the image vector in the phase space of the system;  $X(x,t) = (X_1(x,t), \dots, X_n(x,t))$  is a continuous function in  $t$  with bounded continuous partial derivatives with respect to  $x$ ,  $X(0,t) = 0$ ; the elements  $b_{ij}(t)$ ,  $i = 1, 2, \dots, n$ ;  $j = 1, 2, \dots, r$  of the matrix  $B(t)$  are continuous; the piecewise continuous control term  $u(t)$  has the

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components  $u_j(t)$ ,  $j = 1, 2, \dots, r$  which satisfy the condition  $A_1$  :

$$\int_{t_0}^t |u_j(\tau)|^p d\tau \leq 1, \quad p > 1, \quad j = 1, 2, \dots, r$$

or the condition  $A_2$  :

$$|u_j(\tau)| \leq 1, \quad t_0 \leq \tau \leq t, \quad j = 1, 2, \dots, r$$

The control term  $u^0(t)$  is sought for which the point  $x$ , moving on the controlled trajectory of the system, passes from the point  $x(t_0) = x_0$  into the origin in the shortest time  $T$ . The main content of the paper consists in the proof of the theorem : If there exists an optimal control term  $u^0(t)$  under condition  $A_2$  , then under condition  $A_1$  there exists a number  $p_1$  such that the optimal control term  $u(p, t)$  (for the problem with condition  $A_1$ ) also exists for  $p > p_1$  , where for  $p \rightarrow \infty$  it holds :

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B112/B108

AUTHOR: Kirillova, F. M.

TITLE: Continuous dependence of the solution to an optimum control problem on the initial data and parameters

PERIODICAL: Uspekhi matematicheskikh nauk, v. 17, no. 4 (106), 1962, 141-146

TEXT: The author considers a control problem which is described by the equation  $dx/dt = f(x, t, \lambda) + B(t, \lambda)u(t)$ , where  $x$  is a vector in real  $n$ -dimensional space  $X$ ,  $\lambda$  is a numerical parameter ( $\lambda \in \Lambda$ ),  $B(t, \lambda) = (b_{ik}(t, \lambda))$  ( $i = 1, \dots, n; k = 1, \dots, r$ ) is a matrix,  $u(t)$  is a piecewise continuous controlling influence satisfying the conditions  $|u_k(t)| \leq 1$  ( $k = 1, \dots, r$ ).

It is assumed that  $\Lambda$  is an open set,  $B$  is continuous on  $t \times \Lambda$ , the function  $f(x, t, \lambda) = (f_1(x, t, \lambda), \dots, f_n(x, t, \lambda))$  and its partial derivatives  $\partial f / \partial x_j$  ( $j = 1, \dots, n$ ) are continuous on  $X \times t \times \Lambda$ ,  $f$  fulfills Lipschitz conditions in  $X$  uniformly with respect to  $\lambda$ , and  $f(0, t, \lambda) = 0$ . It is demonstrated that

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the minimum time  $T(x_0, t_0, \lambda)$  for which  $x(x_0, t_0, \lambda, T, u(T)) = 0$  depends  
continuously on  $x_0$  and  $\lambda$ .

SUBMITTED: July 27, 1959

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L-10251-63 EWT(d)/FCO(w)/BDS AFFTC/ASD/APOC Pg-4/Pk-4/Pl-4/Pc-4/  
Pq-4 CG/BC/IJP(O)  
ACCESSION NR: AF3001085 8/0103/63/024/006/0757/0763

AUTHOR: Gabasov, R. (Sverdlovsk); Kirillova, T. N. (Sverdlovsk) r/8

TITLE: Optimum processes in coordinated control systems Q

SOURCE: Avtomatika i telemekhanika, v. 24, no. 6, 1963, 757-763

TOPIC TAGS: coordinated automatic-control systems

ABSTRACT: Optimum processes in two controlled systems are analyzed mathematically. Both systems contain parameters which are so selected that a transient process in one of the systems is finished in a shortest time while phase coordinates of the other system are limited in a specified way. The latter requirement makes both systems coordinated. The problem was formulated by A. A. Fel'dbaum (Computers in automatic systems, Fizmatgiz, 1959). Orig. art. has: 2 figures and 16 formulas.

ASSOCIATION: none 16C

SUBMITTED: 14Sept62

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ENCL: 00

SUB CODE: 00

NO REF SOV: 007

OTHER: 002

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Card 1/1

GABASOV, R.; KIRILLOVA, F. M. ( Sverdlovsk)

"Application of the theory of linear inequalities to optimal control problems"

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 Jan - 5 Feb 1964.

ACCESSION NR: AP4015301

S/0280/64/000/001/0132/0142

AUTHOR: Gabasov, R. (Sverdlovsk); Kirillova, F. M. (Sverdlovsk)

TITLE: Problems of optimum control

SOURCE: AN SSSR. Izvestiya. Tekhnicheskaya kibernetika, no. 1, 1964, 132-142

TOPIC TAGS: optimum automatic control, optimum automatic control theory, controlling variable constraint, phase coordinate constraint, controllable order automatic system

ABSTRACT: Optimum processes are theoretically examined in coupled automatic-control systems which have a controlling-variable constraint and a phase-coordinate constraint in one of the component systems at predetermined moments of time. Systems are studied that contain, in addition to ordinary controls, free parameters in their right-hand members; the parameters can be selected at specified moments of time. By using the L-problem results, this form of the optimum control for a two-plant coupled automatic system (see Fig 1, Enclosure 1) has been developed;

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ACCESSION NR: AP4012345

S/0199/64/005/001/0086/0093

AUTHOR: Kirillova, F. M.

TITLE: The problem of the existence of an optimum control function for a linear system with random perturbations

SOURCE: Sibirskiy matematicheskiy zhurnal, v. 5, no. 1, 1964, 86-93

TOPIC TAGS: automation, control system, optimum control, linear system optimum control, Markov process

ABSTRACT: A generalization of the known optimum control problem discussed by R. Bellman, J. Glicksberg and O. Gross (Quart. Appl. Math., 14, No. 1 (1956), 11-18) and other Soviet and Western authors is presented. The approach differs from the usual in that an optimum control action is sought rather than a choice of an optimum operator. Let there be given a linear system which is acted upon periodically by a random perturbation whose distribution obeys the laws of a Markov process. The main result of the paper is to demonstrate that a damping of the system exists such that the expected percentage of the time that the system shall be "distant" from the rest state shall be a minimum. More exactly, let there be given a system of differential equations

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$$\frac{dx}{dt} = Ax + bu + cv \tag{1}$$

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where  $x = (x_1, x_2, \dots, x_n)$  is the representation vector in the phase space  $X$ ,  $b = (b_1, \dots, b_n)$ ,  $c = (c_1, \dots, c_n)$  are constant (real) vectors,  $A = (a_{ij})$  is any matrix of order  $n$ , and  $u(t)$  is a piecewise continuous "control factor: satisfying:

$$|u(\tau)| < 1, \quad t_0 < \tau < t. \tag{2}$$

It is assumed that  $b, Ab, \dots, A^{n-1}b$  are linearly independent and that the characteristic roots of  $P_1$  of the matrix  $A$  satisfy

$$\operatorname{Re} p_l < 0, \quad l = 1, \dots, n. \tag{3}$$

Let the function  $\eta(\tau)$  define a Markov process. At any given time  $\tau = t$ ,  $\eta(\tau)$  will assume one of the values  $\eta_m$ ,  $m = 1, \dots, l$  and the transition between two values of  $\eta(\tau)$  will occur at times  $t = k \tau_0$ ,  $k = 1, 2, \dots$ ,  $\tau_0 > 0$  a constant, the probabilities of all transitions being equal. It is assumed that  $\eta(\tau)$  is continuous from the right. Let  $\|x\|$  be taken as the usual norm in the phase space  $X$ , and let  $X(x_0, t_0, \eta_0, u, \eta, t)$  be a random solution of (1) for control factor  $u(t)$ , and perturbation function  $\eta(\tau)$  with initial conditions  $t = t_0$ ,  $\eta = \eta_0$ ,  $x(t_0) = x_0$ . Let  $p(x_0, t_0, \eta_0, u, t)$  be the probability that

$$\|x(x_0, t_0, \eta_0, u, \eta, t)\| > 0.$$

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If  $g(t)$  denotes the 'realization function' of  $\eta(\tau)$  for  $t_0 \leq \tau < t$ , then the problem of the present paper can be stated as follows: for  $t_0 = 0$ ,  $x(0) = x_0$ ,  $\eta_0$  all given, and if information about the value of  $\eta(\tau)$  for  $0 \leq \tau < t$  is given, then it is required to choose  $u_1(g)$  such that it satisfies (2) and guarantees that the value of the function

$$T(u) = \int_0^t p(x, t, \eta, u, t) dt. \tag{4}$$

shall be a minimum. The integral (4) expresses the mathematical expectation of how often  $x(x_0, t_0, \eta_0, u, \eta, t)$  will fall at a positive distance from the origin of the phase space. The main result is the following theorem: If the above conditions for the function  $\eta(\tau)$  are fulfilled, no matter what the initial conditions  $x(0)$ ,  $n(0)$  for the system (1), there exists at least one optimum piecewise constant function  $u_1^*(g) = \text{sign}(1 \cdot \nabla(g, t))$  where  $\nabla(g, t)$  is a continuous function which assumes the value zero only at isolated points  $t$ . "In conclusion, the author notes that N. N. Krasovskiy first acquainted her with optimal control problems." Orig. art. has: 16 formulas.

ASSOCIATION: none

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SUB CODE: IE, MA

NO REF SOV: 009

OTHER: 002

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ACCESSION NR: AP4033354

S/0103/64/025/003/0312/0320

AUTHOR: APPROVED FOR RELEASE: 06/13/2000 F. CIA-RDP86-00513R000722710004

TITLE: Method for solving some problems of optimum control

SOURCE: Avtomatika i telemekhanika, v. 25, no. 3, 1964, 312-320

TOPIC TAGS: automatic control, optimum automatic control, terminal control, automatic control theory

ABSTRACT: A method proposed for solving the terminal-control problem is based on the theory of linear inequalities. This not only permits finding the transversal conditions for the movable right-hand end of a trajectory but also finding a way to calculate the initial conditions for a conjugate system and to investigate the function  $I^* = \min_u I(u)$  of the coordinates  $x_{10}, x_{20}, \dots, x_{n0}$  of the initial condition  $x_0$ . Here, the functional:

$$I(u) = (x_1^2(x_0, u, T) + \dots + x_n^2(x_0, u, T))^{1/2} = \|x(x_0, u, T)\|_2;$$

Card 1/2



ACCESSION NR: AP4033354

$x(x_0, u, t)$  is the trajectory of a fundamental differential equation which corresponds to the permissible control  $u = u(t)$ . Orig. art. has: 3 figures and 36 formulas.

ASSOCIATION: none

SUBMITTED: 17Jun63

DATE ACQ: 15May64

ENCL: 00

SUB CODE: DP, IE

NO REF SOV: 008

OTHER: 002

Card

2/2

ACCESSION NR: AP4042491

S/0103/64/025/007/1058/1066

AUTHOR: Gabasov, R. (Sverdlovsk); Kirillova, F. M. (Sverdlovsk)

TITLE: Solving some problems in the theory of optimum processes

SOURCE: Avtomatika i telemekhanika, v. 25, no. 7, 1964, 1058-1066

TOPIC TAGS: automatic control, optimum automatic control, automatic control theory, movable ends automatic control

ABSTRACT: The problems of an optimum control with two movable ends are solved by a functional-analysis method. Problem 1: The motion of the plant is described by  $dx/dt = A(t)x + B(t)u$ , (1) where  $x = \{x_1, x_2, \dots, x_n\}$  is the vector of phase coordinates,  $A, B - (n \times n), (n \times r)$  are the matrices whose coefficients depend on time  $t$ ,  $u = \{u_1, u_2, \dots, u_r\}$  is the vector of the controlling variable. Vectors  $c$  and  $d$  are specified in the phase space of Equation (1). For specified  $t_0, T, \Delta, L, a$

Card 1/2

KIRILLOVA, F.M.; LEVANOV, A.N.; GEBASOV, R.

Plotting diagrams of contact friction forces in plastic upsetting.  
Izv. vys. ucheb. zav.; chern. met. 7 no.3:87-94 '64.

1. Ural'skiy politekhnicheskiy institut.

(MIRA 17:4)

ACCESSION NR: AP4042491

control  $u(t)$ ,  $t_0 \leq t \leq T$ ,  $\|u\| \leq L$ , is found which satisfies these conditions:

$\|x(t_0) - c\|_1 \leq \Delta$ ,  $\|x(T) - d\|_2 = \delta^0 = \min$ . Problem 2: For the same data as above, a control is found which satisfies these conditions:  $\|x(t_0) - c\|_1 \leq \Delta$ ,

$\|x(T) - d\|_2 = \delta^0 = \max$ . Problems 3, 4, 5: Controls  $u(t)$ ,  $u \in U$ ,  $\|u\| \leq L$ , are found satisfying these conditions:

$$\begin{array}{ll} \|x(t_0) - c\|_1 = \Delta^0 = \min, & \|x(T) - d\|_2 \leq \delta \\ \|x(t_0) - c\|_1 = \Delta^0 = \min, & \|x(T) - d\|_2 \geq \delta \\ \|x(t_0) - c\|_1 = \Delta^0 = \max, & \|x(T) - d\|_2 \leq \delta \end{array}$$

Problem 6, presenting two coordinates of different plants pursuing each other, is also solved. "The authors wish to thank V. K. Ivanov for a very useful discussion." Orig. art. has: 78 formulas.

ASSOCIATION: none

SUBMITTED: 09Aug63

ENCL: 00

SUB CODE: ES, DP

NO REF SOV: 005

OTHER: 001

Card 2/2

GABASOV, R.; KIRILLOVA, F.M.

Optimization of convex functionals on the trajectories of  
linear systems. Dokl. AN SSSR 156 no. 5:1007-1010 Je '64.  
(MIRA 17:6)

1. Ural'skiy politekhnicheskiy institut im. S.M.Kirova.  
Predstavleno akademikom L.S.Pontryaginym.

L 4200-66 ENT(a)/ENP(v)/ENP(x)/ENP(h)/ENP(l) LJP(c) BC

ACCESSION NR: AP5023353

UR/0020/65/164/001/0016/0019

AUTHORS: Gabasov, R.; Kirillova, P. M.

TITLE: Statistical problem of optimal control of a linear system

SOURCE: AN SSSR. Doklady, v. 164, no. 1, 1965, 16-19

TOPIC TAGS: optimal control, probability, differential equation

ABSTRACT: The authors treat various problems concerning the minimization of  $\|x(T)\|$  where

$$\dot{x} = A(t)x + a(t)b(t)u + r(t), \quad x(t_0) = x_0, \quad |u| \leq 1, \quad (1)$$

when  $r(t)$  is a stochastic process. In one case  $\|x(T)\|$  is the expectation. Sometimes the solution is the same as if the problem were deterministic, in other cases it reduces to the solution of a game with a saddle point. The characteristics of the random vector which determines the optimal control in the posed problem are studied. It is shown that in certain cases the optimal control depends on the complete distribution of the random process. The authors relate this study to the maximum principle for a deterministic system. Orig. art. has: 9 formulas.

ASSOCIATION: Ural'skiy politekhnicheskii institut im. S. M. Kirova (Ural Polytechnical Institute)

Card 1/2

46  
B

L 4200-66

ACCESSION NR: AP5023353

SUBMITTED: 03Dec64

ENCL: 00

SUB CODE: IE, MA

NO REF SOV: 006

OTHER: 000

Card 2/2 DP

I 21445-66 EMT(d)/EMP(v)/T/EMP(k)/EMP(h)/EMP(l) IJP(c)

ACC-NR: AP6007858

SOURCE CODE: UR/0103/66/000/002/0005/0017

AUTHOR: Gabasov, R. (Sverdlovsk); Kirillova, F. M. (Sverdlovsk)

34  
B

ORG: none

TITLE: Construction of successive approximations for certain optimal control problems

16.44.55

14

SOURCE: Avtomatika i telemekhanika, no. 2, 1966, 5-17

TOPIC TAGS: optimal control, terminal control, successive approximation

ABSTRACT: It is stressed that solving optimal control problems by means of the Pontryagin maximum principle is difficult because of the absence of effective means for determining the initial conditions (of the vector  $\psi_0$ ) for solving the conjugate system of equations by which the maximum principle is formulated. A method of convergent successive approximations is presented for determining  $\psi_0$  in certain problems of the theory of optimal control. This method is based on the geometric interpretation of the function  $\lambda(g)$ , where  $g$  is a set of vectors. (The method used here for solving optimal control problems is based on certain concepts of function analysis in which minimization of the performance functional is reduced to determining the extremum of the function  $\lambda(g)$ . The linear control system described by the system of equations

$$\dot{x} = A(t)x + b(t)u, \quad x(0) = x_0, \quad (1)$$

Card 1/2

UDC: 62-505.7



I 21445-66

ACG NR: AP6007858

where  $x(t)$  is an  $n$ -dimensional vector function,  $A(t)$  is a matrix,  $b(t)$  is a vector, and  $u(t)$  is a selected control function for which the problem of the terminal control is analyzed. It is established that  $\lambda(g)$  is a concave function. This fact makes it possible to determine, by known methods, that value  $g^*$  optimizing the function  $\lambda(g)$ . It is shown that  $\lambda(g)$  is closely related to the pedal curve of the jet of points (set of attainability) which can be attained in time  $\tau(0 \leq \tau \leq T)$  moving from the point  $x_0$  along the permissible trajectory of equation (1). Using this geometrical interpretation, the procedure for successive approximations of the value  $g^*$  is presented. It is shown that the obtained sequence of approximations converges to the value  $g^*$ , but the rate of convergence of the iterative process is not analyzed. Modifications of the method are derived and their application to the solution of simple optimal control problems is presented. Orig. art. has: 11 formulas and 5 figures. [LK]

SUB CODE: 12 SUBM DATE: 08Feb65/ ORIG REF: 023/ OTH REF: 005/ ATD PRESS: 4221

Card 2/2 JUR

*Kirillova, G. A.*

USSR/Biology - Biochemistry

Card 1/1 Pub. 22 - 47/63

Authors : Blagoveshechenksiy, A. V., and Kirillova, G. A.

Title : Proteolytic fermentation in the process of cooling winter wheat grain

Periodical : Dok. AN SSSR 99/6, 1065-1067, Dec 21, 1954

Abstract : Experiments were conducted to determine the change in activity and quality of autolytic proteolysis of winter wheat. In addition the authors investigated the activity and quality of proteolytic fermentation not only in the whole grain but also in the seed and endosperm. Results indicate that cooling increases the quality of grain fermentation and makes it possible for the seeds to adopt themselves to possible temperature fluctuations and does not weaken the nitrogen exchange processes even at very-low temperatures. Two USSR references (1950 and 1951). Tables.

Institution : Academy of Sciences USSR, Main Botanical Garden

Presented by: Academician N. V. Tsitsin, June 26, 1954

KIRILLOVA, G. A.

KIRILLOVA, G. A.

"Nitrogen Metabolism and Proteolytic Enzymes of Winter Wheat During Vernalization." Cand Biol Sci, Moscow State Pedagogical Institute V. I. Lenin, Moscow, 1955. (KL, No 10, Mar 55)

SO: Sum No. 670, 29 Sep 55 - Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (15)

KIRILLOVA, G. A.

USSR/ Agriculture - Biochemistry

Card 1/1 Pub. 22 - 45/50

Authors : Blagoveshchenskiy, A. V., and Kirillova, G. A.

Title : Effect of tentative chilling on the nitrogen-containing substances of the seed and endosperm of winter wheat

Periodical : Dok. AN SSSR 100/1, 171-173, Jan. 1, 1955

Abstract : The biochemical processes occurring during the chilling of swollen winter wheat seeds are discussed. The general content of nitrous substances during the chilling of winter wheat seeds is analyzed. The effect of tentative chilling of these nitrogenous substances were investigated and the results are tabulated. Three USSR references (1937-1954). Tables.

Institution : .....

Presented by : Academician N. V. Tsetin, June 26, 1954

KIRILLOVA, G.A.

Free amino acids in temporarily chilled winter wheat. *Fiziol. rast.*  
5 no.2:182-185 Mr-Apr '58. (MIRA 11:4)

1. Kafedra botaniki Moskovskogo pedagogicheskogo instituta im.  
V.I. Lenina.

(Wheat) (Amino acids) (Cold--Physiological effect)

FADEYEVA, T.S.; KIRILLOVA, G.A.

Study of heterosis in strawberry hybrids during early developmental  
stages. Issl. po gen. no.1:147-160 '61. (MirA 15:1)  
(HETEROSIS) (STRAWBERRY BREEDING)

KIRILLOVA, G.A.

Obtaining diploid homozygous tomato forms by using haploid  
somatic mutants. Vest. LGU 20 no.3:97-104 '65.

(MIRA 18:2)

KIRILLOVA, G.A.; BOGDANOVA, Ye.N.

A mutant form of haploid tomato. Issl. po gen. no.2:86-89 '64.  
(MIRA 18:4)



KIRILLOVA, O.A.

Twine in tomato plants. Issl. po gen. no.2:121-124 '64. (MIRA 18:4)

KIRILLOVA, G.A.

Effect of succinic acid on the nitrogen metabolism of germinating  
caryopses of spring wheat. *Biul. Glav. bot. sada no.56:52-57 '62.*  
(MIRA 18:5)

1. Moskovskiy gosudarstvennyy pedagogicheskiy institut imeni Lenina.

KIRILLOVA, G.A.

Production of somatic mutations in haploid tomatoes and their transition into a diploid state. Genetika no.3:65-69 S '65.  
(MIRA 18:12)

1. Leningradskiy gosudarstvennyy universitet, kafedra genetiki i seleksii. Submitted April 24, 1965.

80834

S/149/60/000/03/04/009

5.2100  
15.2220

AUTHORS: Kirillova, G.F., Meyerson, G.A., Zelikman, A.N. <sup>1</sup>

TITLE: Kinetics of the Chlorination of Titanium and Niobium Carbides <sup>1</sup>

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, 1960, No 3, pp 90 - 96

TEXT: The method of preparing niobium and titanium chlorides from TiC and NbC, which may be obtained from oxides or directly from Ti and Nb concentrates, is of considerable interest. Information is given on results of investigations into kinetics of chlorinating pure Ti and Nb carbides. Carbide powders were used as initial material, obtained by the reduction of TiO<sub>2</sub> and Nb<sub>2</sub>O<sub>5</sub> oxides with lamp black in a coal-tubular furnace in hydrogen atmosphere at 1,900° - 2,000°C and 1,700° - 1,800°C respectively. The chemical composition of the carbides is given in Table 1. The experiments were performed on compact cylindrical specimens contained in a tube; chlorine flow was passed through the tube at a certain speed and temperature; the loss in weight of the specimen was recorded as well as the amount of chloride developed during a given time interval. The experimental installation is shown

Card 1/3

80834

S/149/60/000/03/04/009

## Kinetics of the Chlorination of Titanium and Niobium Carbides

in Figure 1. The weight loss of the specimens was the basic and most accurate indicator of the chlorination rate. The experimental results were expressed in the weight rate ( $\text{g}/\text{cm}^2\cdot\text{min}$ ) or linear rate ( $\text{mm}/\text{min}$ ) characterizing the extension of the process into the depth of the specimen. Computational data were checked by direct measurements with the aid of a binocular microscope (x 28). Table 2 shows that the computational and measured values are in a satisfactory agreement. The following conclusions are drawn: The chlorination process was accompanied by the development of an external graphite layer whose effect on the rate of the process was not noticed at  $400^\circ\text{C}$ ; at  $600^\circ$  and  $800^\circ\text{C}$  a certain diffusional inhibition of the reaction was observed; chlorination acquired the characteristic of an intermediate process between the kinetic and diffusion processes, the first one being prevalent. It was established that the compact Nb carbide was chlorinated slower at  $800^\circ$  than at  $600^\circ\text{C}$ . This is apparently due to a higher adhesion strength of the graphite layer to the Nb carbide. The chlorination rate of Ti carbide increased rapidly at higher temperatures. The revealed dependence of the chlorination depth on the duration of the process was used to calculate the optimum time of chlorination of Ti and Nb carbide

Card 2/3

80834

S/149/60/000/03/04/009

Kinetics of the Chlorination of Titanium and Niobium Carbides

particles of different sizes at 400°, 600° and 800°C. This may play a part in the evaluation of the chlorination rates of powder-like carbides in a fluidized bed. There are 2 tables, 1 diagram, 3 sets of graphs and 6 references: 3 Soviet, 2 English and 1 German.

ASSOCIATION: Krasnoyarskiy institut tsvetnykh metallov (Krasnoyarsk Institute of Non-Ferrous Metals), Kafedra metallurgii redkikh metallov (The Chair of Metallurgy of Rare Metals)

SUBMITTED: December 10, 1959

Card 3/3

KIRILLOVA, G.F.

7 1111  
153100 230c, 114, 144, 113

9557  
5/19/66, 000, 005, 009, 015  
005, 001

Author: Kirillova, G.F.  
Editor: [Name obscured]  
Investigator: [Name obscured]  
Title: [Title obscured]

ABSTRACT: The authors investigated kinetics of reaction of titanium-iron oxide...  
Detailed abstract text follows, describing the experimental setup and results of the study.

9557

5/19/66, 000, 005, 009, 015  
005, 001

Table 1  
Investigation Data Conditions of Titanium-Iron Oxide Calcination  
Maximum possible duration of oxide particle calcination

Temperature deg	Particle size nm	Duration of calcination, min in the presence of a fluoride layer	Fluoride layer
800	0, 250	8, 0	1, 58
800	0, 075	2, 8	1, 68
800	0, 042	1, 2	1, 58
600	0, 250	17	1, 58
600	0, 075	5	1, 16
600	0, 042	3	2, 3

Calcination in a fluoride bed was studied on a furnace shown in Figure 1.

and 3/6

9357

6/19/80/001/001/001/015  
000/001

Investigation into conditions of Titanium-Nickel Oxide Chlorination

Figure 1  
Process for the chlorination of complex oxide in a fluidized bed

Card 4/6

1 - body; 2 - trapezoidal lining; 3 - graphite grid; 4 - aluminum basket; 5 - outside burn; 6 - burner; 7 - reactor; 8 - gas distributor; 9 - riser pipe; 10 - discharge pipe; 11 - powder distributor; 12 - valve; 13 - pressure gauge; 14 - gas outlet; 15 - gas outlet; 16 - gas outlet; 17 - gas outlet; 18 - gas outlet; 19 - gas outlet; 20 - gas outlet.

Card 5/6

There are 3 figures and 1 brief reference.

ASSOCIATION: Potentially sensitive steel (Stainless Steel Institute) Research  
Facility available in Pennsylvania (Department of Physics of Metals  
and of Metallurgy)

REPORTED: October 27, 1959

Card 6/6



KIRILLOVA, G.F.

U/000/01/000/000/000/000  
10/10/1961

**AUTHORS:** Myerson, G.A., Zelikman, A.M., Belyayevskaya, L.V., Faytina, M.Ya., and Kirillova, G.F.

**TITLE:** Investigation of the chlorination processes of titanium and niobium carbides, complex titanium-niobium carbide, and some other compounds

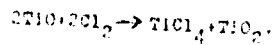
**SOURCE:** Akademiya nauk SSSR. Institut metallurgii. Titan i ego splovy, no. 5, Moscow, 1961. Metallurgiya i khimiya titan, 107-110

**TEXT:** The authors studied the reactions of titanium carbides and nitrides, niobium, complex Ti-Nb carbide, TiO and silicon carbide with chlorine in chlorination for obtaining TiCl<sub>4</sub>. The experiments were conducted in view of the advantageous technological properties of titanium carbide and titanium carbonitride, the possible future use of the boiling layer for chlorinating them, and because precarbonization of rutile and ilmenite is used in foreign titanium production practice. Generalized results of the studies are given and a detailed illustrated description of the experimental equipment pre-

Card 1/3

Investigation of the chlorination processes ... 7/29/52/110/001/007/010  
8070/311

...ent. Titanium carbide, and titanium and niobium nitrides chlorinated fastest of all compounds, starting to chlorinate at 400°C. Active reaction of Nb carbide with chlorine was observed at 430°C, and of niobium carbide from above 600°C. Chlorination of TiO at a perceptible rate started from 300°C. In the range 400-700°C, the TiO chlorination degree was 2%, which is explained by the reaction



In the presence of carbon, TiO chlorinated much faster than a mixture of TiO<sub>2</sub> with carbon. Titanium carbide was prepared with 1000°C in a hydrogen atmosphere in a carbon-tube furnace at 2000°C, and niobium carbide in the same way at 1700-1800°C, and pressed into cakes with 110 k/cm<sup>2</sup> and 325 k/cm<sup>2</sup> pressure at 2150-2200°C and 2700-2750°C respectively. The chlorination of these carbides was accompanied by the formation of a graphite layer which did not affect the chlorination rate at 400°C but caused some inhibition at 600° and 800°C. Ti-Nb carbide was produced by carbidization of loparite concentrate with subsequent washing in hydrochloric acid

Card 2/3

Investigation of the chlorination processes...

1969/11/13

for separating the carbides of other elements, and its composition (in %)  
 was 46.80 Ti, 15.21 Nb, 0.70 Zr, 2.62 Si, 0.24 C, 11.22 O, 1.76 H,  
 3.56 O, and 7.41 other elements. The constants of TiC chlorination rate  
 were higher than of NbC, particularly at 600°C, and the chlorination rate  
 of Ti-Nb carbide from leucite was close to the chlorination rate of pure  
 TiC. The minimum necessary time for chlorination of carbide particles of  
 different size at different temperatures has been determined. Chlorination  
 of Ti-Nb carbide in the boiling layer was studied in a small laboratory  
 furnace and in one of larger size, and proved feasible with the use of chlor-  
 ine as well as chlorine with air. The TiCl<sub>4</sub> output rate from powder car-  
 bide in the boiling layer proved to be more than 10 times higher than in  
 direct chlorination of oxides or concentrated ore in mixture with carbon.  
 The chlorination degree of Ti-Nb carbide in the boiling layer amounted to  
 27-29%. There are 10 figures.

Card 3/3

S/137/62/000/005/026/150  
A006/A101

AUTHORS: Meyerson, G. A., Zelikman, A. N., Belyayevskaya, L. V., Tseytina,  
N. Ya., Kirillova, G. F.

TITLE: Processing of titanium-niobium rare-earth complex raw material by  
carbideization and chlorination

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 5, 1962, 13, abstract 5080  
("Sb. nauchn. tr. In-t tsvetn. met. im. M. I. Kalinina", 1960,  
v. 33, 175-185)

TEXT: The processing of Ti-Nb raw material by the method of carbideization  
and chlorination was conducted on a laboratory and enlarged scale. The method  
consists in heating a mixture of the concentrate with coal in an electric furnace  
at 1,800 - 1,900°C. The complex raw material elements are then transformed into  
carbides and divided into the following two groups according to their properties:  
1) TiC, NbC, TaC, SiC - strong refractory compounds, and 2) carbides of rare  
earth elements Ca, Na, Al and Fe, dissolving in diluted acids. Processing of a  
carbideization product with 10% HCl makes it possible to separate all soluble  
elements from refractory carbides. The washed and dried residue (solid solution

Card 1/2

Processing of titanium-niobium ...

S/137/62/000/005/026/150  
A006/A101.

of Ti, Ni, Ta carbides) is chlorinated at 800°C with subsequent separation of chlorides in condensers and cleaning by rectification. Results of investigations are presented.

G. Svodtseva

[Abstracter's note: Complete translation]

Card 2/2

S/081/62/000/017/053/102  
B158/B186

**AUTHORS:**

Meyerson, G. A., Zelikman, A. N., Belyayevskaya, L. V.  
Tseytina, N. Ya., Kirillova, G. P.

**TITLE:**

Processing titanium-niobium rare earth complex raw material  
by carbidization-chlorination

**PERIODICAL:**

Referativnyy zhurnal. Khimiya, no. 17, 1962, 354; abstract  
17K10 (Sb. nauchn. tr. In-t tsvetn. met. im. M.I.Kalinina,  
v. 33, 1960, 175-185)

**TEXT:** The processing of loparite concentrate is examined. A Ta-Nb concentrate, containing (%)  $TiO_2$  30-35,  $(Nb, Ta)_2O_5$  8-10, rare earth oxides 30,  $SiO_2$  4.5-6.0,  $Fe_2O_3$  2.5-3.0, CaO 4-6,  $Na_2O$  6-8, is heated in a mixture with coal at 1800-1900°C in an electric furnace and the resulting carbides are chlorinated. At 1900°C carbidization is practically complete in 0.5 hr, 30-75 (50) % of the silicon being volatilized from the charge as  $SiO$ . In chlorination, 50% of the  $TiO$  is chlorinated at 400-700°C; in the presence of carbon, chlorination of the  $TiO$  at 500-600°C is practically  
Card 1/2

Processing titanium-niobium rare...

S/081/62/000/017/053/102  
B158/B186

complete in 1 hr. 94% of the NbC is chlorinated at 600°C in 1 hour.  
96% of the complex carbide containing TiC-NbC-SiC is chlorinated in 1 hour  
at 600°C. The kinetics of chlorination of the carbides obtained and  
pressed by various methods are studied. Chlorination of the concentrates  
in a pilot-scale unit is described. A reactor diagram is presented.  
[Abstracter's note: Complete translation.]

✓  
-

Card 2/2

MEYERSON, G.A.; ZELIKMAN, A.N.; BELYAYEVSKAYA, L.V.; TSEYTINA, N.Ya.;  
KIRILLOVA, G.F.

Investigating the chlorination processes of titanium and  
niobium carbides, of complex titanium-niobium carbides and  
certain other compounds. Titan i ego splayv no.5:167-180  
'61. (MIRA 15:2)

(Titanium compounds)  
(Chlorination)



MEYERSON, G.A.; ZELIKMAN, A.N.; BELYAYEVSKAYA, L.V.; TSEYTINA, N.Ya.;  
KIRILLOVA, G.F.

Processing of complex titanium-niobium bearing rare earth  
minerals by the carburizing and chlorination method. Sbor.  
nauch. trud. GINTSVETMET no.33:175-185 '60. (MIRA 15:3)  
(Titanium ores) (Rare earths)

KIRILLOVA, G. K.

Effect of surgery of abdominal organs in pulmonary tuberculosis.  
Khirurglia, Moskva, No. 6, June 50. p. 27-32

1. Of the Hospital Surgical Clinic (Director—Prof. V. E. Salishchev),  
First Moscow Order of Lenin Medical Institute.

GLFL 19, 5, Nov., 1950

KIRILOVA, G.K.

Surgery on organs of the abdominal cavity in pulmonary tuberculosis  
Sov.med. no.2:12-14 P '54. (MLRA 7:1)

1. Is gosital'noy khirurgicheskey kliniki (direkter - professor  
V.E.Salishchev) I Moskovskogo ordena Lenina meditsinskogo insti-  
tuta. (Tuberculosis) (Abdomen--Surgery)

KIRILLOVA, G. K.

USSR/Chemical Technology - Chemical Products and Their Application. Silicates.  
Glass. Ceramics. Binders, I-9

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 62297

Author: Bogoroditskiy, N. P., Polyakova, N. L., Kirillova, G. K.,  
Eydel'kind, A. M.

Institution: None

Title: New Varieties of Electrotechnical Ceramics

Original

Periodical: Elektrichestvo, 1954, No 7, 56-60

Abstract: Investigations of the structure of ceramics (C) have shown that they must be regarded as a complex system containing crystalline, glassy, amorphous and gaseous phases. It has been found that electric, physical and mechanical properties of C are determined primarily by their crystalline phase. Studies of crystal formations have made it possible to divide electro-ceramics in 3 groups: polycrystals-dielectrics with high or somewhat decreased dielectric properties (presence or absence of relaxation polarization);

Card 1/2

USSR/Chemical Technology - Chemical Products and Their Application. Silicates.  
Glass. Ceramics. Binders, I-9

Abst Journal: Referat Zhur -- Khimiya, No 19, 1956, 62297

Abstract: polycrystals-electron semiconductors; seignette-electrics. Electric characteristics and chemical composition of these polycrystals and also the systems according to which they crystallize are summarized in a table. The glassy phase of C influences the sintering temperature and plasticity. Gaseous phase (gas in sealed pores) lowers mechanical and electric strength of C. The thus determined properties have made it possible to consider the problem of providing C of high electric and mechanic characteristics and relatively simple technology of mass production. Among the new C which have been put to practical use are ultraporcelain UF-46 and the still better UF-53 a most suitable material for designing small over-all dimensions condensers of high capacity for instance for bridges for determining dielectric losses at voltages up to 10-15 kv; electroceramic steatite materials with a talc base are very promising for use in KM-1 insulators; of very great mechanical strength and high electric indexes are zirconium C Ts-54 and other.

Card 2/2

24(6)

AUTHOR:

Kirillova, G. K.

SOV/57-28-10-13/40

TITLE:

Electrical Properties of Mullite (Elektricheskiye svoystva mullita)

PERIODICAL:

Zhurnal tekhnicheskoy fiziki, Vol 28, Nr 10, 1958  
pp 2186 - 2191 (USSR)

ABSTRACT:

This is a study of the influence of the crystalline and of the amorphous phase and of admixtures upon the magnitude of  $\text{tg } \delta$  (loss angle) in ceramic substances with a mullite content. The mullite under consideration was produced synthetically from source materials of different origin with and without using "mineralizers". The investigation yielded the following results: 1) The dielectric losses exhibited by mullite which was produced synthetically and from which the amorphous phase was completely removed, are very small. 2) The electrical properties of synthetic mullite samples are dependent upon the presence of admixtures in the source components. 3) The  $\text{tg } \delta$  of samples of mullite ceramics produced synthetically is mainly dependent

Card 1/2

Electrical Properties of Mullite

SOV/57-28-10-13/40

upon the amount and the composition of the amorphous phase forming on the basis of the admixtures. 4) Alkaline oxides exert a particularly detrimental influence upon the  $tg \delta$  of mullite ceramics. They favor the formation of aluminium silicate alkaline glass, which substance is characterized by high dielectric losses. 5) The use of additions promoting mullitization, in particular of "asharit", magnesium oxide, calcium fluoride, reduced the  $tg \delta$  of mullite ceramics. There are 5 figures, 3 tables, and 10 references, 8 of which are Soviet.

SUBMITTED: July 5, 1957

Card 2/2

SOV/110-58-8-2/26

**AUTHORS:** Professor Bogoroditskiy, N.P. (Doctor of Technical Science), Kirillova, G.K. and Rozentsveyg, S.M. (Engineers)

**TITLE:** High-strength Ceramic Material for High-voltage Insulators (Keramicheskii vysokoprochnyy material dlya vysokovol'tnykh izolyatorov)

**PERIODICAL:** Vestnik Elektromyshlennosti, 1958<sup>24</sup>, Nr 8, pp 4-6 (USSR)

**ABSTRACT:** To meet increasing demands for porcelain insulators of good mechanical properties, Corundo-mullite ceramic material KM-1 has been developed, as described in Elektrichestvo, 1954, Nr 7. In chemical, mineralogical and phase composition this material is unlike high-voltage porcelain. The crystalline phase consists of about 70% corundum and mullite. The vitreous phase is similar in chemical composition to  $BaO \cdot Al_2O_3 \cdot 2SiO_2$  and  $CaO \cdot Al_2O_3 \cdot 2SiO_2$ . The fired material has a uniform fine grained structure. Production trials on material KM-1 for the manufacture of high-voltage insulators were carried out at the Proletariy Works. The main physical-technical properties of material KM-1 and of high-voltage porcelain are given in Table 1. It will be seen that the mechanical properties

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SOV/110-58-8-2/26  
High-strength Ceramic Material for High-voltage Insulators

of KM-1 surpass those of porcelain. The influence of fineness of milling of the materials used in KM-1 is shown in Table 2, with respect to hardening temperature and mechanical strength. As the material becomes coarser the hardening temperature rises and the strength decreases somewhat. Samples of kaolin from three different sources were used as constituents; it was found that the technological characteristics of KM-1 were practically unaffected. Samples fired at temperatures of 1320 - 1380°C were observed to be very strong. The types of high-voltage insulators that were manufactured for production trials are described. Because of the hardness of KM-1, difficulty was experienced in grinding it with the abrasives ordinarily used for ceramics. Glazes normally used for porcelain can be used for KM-1. Hydraulic-pressure tests on the insulators gave good

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SOV/110-58-8-2/26  
High-strength Ceramic Material for High-voltage Insulators

results. The insulators were very strong; brief details of the test results are recorded. The use of material KM-1 is recommended for the manufacture of high-voltage insulators where specially good mechanical properties are required.

There are 2 tables and 1 Soviet reference.

SUBMITTED: April 17, 1958

1. Ceramic materials--Applications

Card 3/3

KIRILLOVA, G.N.; RADCHENKO, G.O.

Interaction of cellulose with diketone. Zhur. prikl. khim. 37  
no. 4:918-920 Ap '64. (MIRA 17:5)

KIRILLOVA, G.N.; IVANNIKOVA, L.B.; RADCHENKO, G.O.

Synthesis of cellulose acetoacetate. *Khim. prikl. khim.* 37  
no.12:2701 D '64. (1974 18:3)

ARISTOV, Ye.M.; Prinsipali uchastiye: SHESTAKOVA, A.A.; KIRILLOVA, G.N.;  
KADYROVA, Ya.M.

Automatic device for opening press molds after the vulcanization  
of tire casings. Kauch.i rez. 20 no.7:50-51 J1 '61. (MIRA 14:6)

1. Voronezhskiy shinnyy zavod.  
(Tires, Rubber)

BUZHINSKIY, I. M.; KIRILLOVA, I. I.

"Optical method of studying structural changes in glasses of  $\text{LiO}_2\text{-Al}_2\text{O}_3\text{-SiO}_2$  system mineralized by titanium dioxide."

report submitted for 4th All-Union Conf on Structure of Glass, Leningrad, 16-21 Mar 64.

L 11845-66 EWP(e)/EWP(m)/EWP(b) CS/WH

ACC NRI RT6000505

SOURCE CODE: UN/0000/65/000/000/0360/0365

AUTHOR: <sup>44</sup>Bushinskiy, I. M.; <sup>44</sup>Khomyakov, A. M.; <sup>44</sup>Sabayeva, Ye. I.; <sup>44</sup>Kirillova, I. I.

ORG: None

TITLE: The study of structural changes in glasses and glass-crystalline materials by means of various methods

SOURCE: <sup>44</sup>Vestovushnoye soveshchaniya po stekloobraznomu sostoyaniyu. 4th, Leningrad, 1964. Stekloobraznaya sostoyaniye (Vitreous state); trudy soveshchaniya, Leningrad, Izd-vo Nauka, 1965, 360-365

TOPIC TAGS: lithium glass, silicate glass, aluminum silicate, catalyzed crystallization, *glass property*

ABSTRACT: It was shown that during the precrystallization period and during the transition to the glassceramic state significant changes are observed in the linear expansion coefficient, index of refraction, mean dispersion, density, light transmission, and other properties of glasses. The present authors discussed additional experimental data with the aim of making the changes in the quantities listed above more precise. The article covers the changes in the refraction coefficient, specific dispersion, and light transmission as a function

Card 1/2

L 11845-66  
ACC NR: AT6000505

of the temperature and duration of processing. These results indicate that the precrystallization processes consist of a continuous stratification of the glass base into two or more components, one of which represents the nucleus of the future crystalline phase. The size of the particles during the stratification is determined by the temperature, time, glass composition, and the quantity of mineralizer. The stratification is accompanied by changes in all of the physico-chemical properties, and the processes, causing the changes of these properties, continue to exist during the crystallization process. Orig. art. has: 4 figures and 1 table.

SUN CODE: 11, 20 / SUNN DATE: 12/24/65 / ORG NR: 040 / ORN NR: 004

HW  
Card 2/2



L 27745-66 ENT(m)/EWP(t)/ETI IJP(e) JD

ACC NR: AP6001580

SOURCE CODE: UR/0120/65/000/006/0130/0135

AUTHOR: Tal'roze, V. L.; Pavlenko, V. A.; Tantsyrev, G. D.;  
Grishin, V. D.; Ozerov, L. N.; Kirillova, I. I.; Rafal'son, A. R.  
Shutov, M. D.

38  
13ORG: Institute of Chemical Physics of AN SSSR, Moscow (Institut khimicheskoy fiziki)TITLE: MKh1307<sup>H</sup> chromat-mass-spectrometer<sup>10</sup> (Khromass-2)SOURCE: Pribery i tekhnika eksperimenta, no. 6, 1965, 130-135TOPIC TAGS: chromatography, mass spectrometer

ABSTRACT: The design and operation of MKh1307 mass-spectrometer is described. This spectrometer is formed by combining a chromatograph with a two-beam magnetic mass-spectrometer. A laboratory version of Khromass-2 spectrometer served as a prototype for MKh1307 type. The arrangement of MKh1307 chromat-mass-spectrometer is schematically shown on Card 2/2. The chromatograph (1) is connected via a dose-valve (2) to the ion-source (3) of the mass-spectrometer which is equipped with two large (4 and 5) and two small (6 and 7) collectors. By using a switch (8) the collectors can be connected to a set of two electrometer amplifiers (9). Double ion currents are automatically recorded

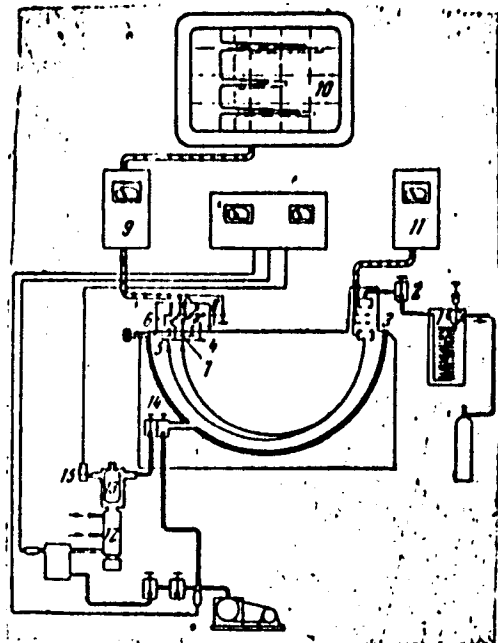
2

Card 1/3

UDC: 543.51+543.544

L 27745-66

ACC NR: AP6001580



by an electronic potentiometer (10). The ion source was fed from an electronic circuit (11). The small collectors were used for measurements of two mass-spectral lines while the large ones collected the intensities of two line groups. The spectral peaks were measured for each of two measuring channels and their heights were compared. The peak ratio was used for defining tested substances. The design of chromatograph was illustrated and described. It can be equipped either with capillary or packed columns. The ion system consisting of ion source, mass analyzer and ion collectors, was also described and diagrammatically represented. The ion source was placed in the magnetic field of a mass-analyzer. A permanent magnet of about 6000 gauss was used. The resolving power of the mass-spectrometer was

Card 2/3

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ACC NR: AP6001580

about 50. The ion collectors were designed for a simultaneous measurement of two spectral lines differing in masses from 4 to 6%. A simultaneous recording was also provided for two groups of lines including one group of 34 to 45 amu and the second of 48 to 100 amu. The electronic circuit feeding the ion source was designed for cathode currents up to 2 ma, accelerating voltages of 300 to 1200 v and ionizing voltages of 50 to 100 v. The vacuum system was also described and the MKh1307 apparatus was shown in a photo. Some results of measurements were summarized in a table. A high sensitivity of the MKh1307 spectrometer permits defining the mixtures with contents up to  $10^{-4}\%$ . Orig. art. has: 5 figures.

SUB CODE: 20 / SUBM DATE: 50oct64 / ORIG REF: 010 / OTH REF: 006

Card 3/3 *Jo*

KIRILLOVA, I.N.

Disorder of glycogen metabolism in rabbits under the influence of  
therapeutic doses of aminazine. Nauch. trudy Riaz. med. inst. 15:  
24-26 '62. (MIRA 17:5)

1. Kafedra patologicheskoy anatomii (zav. kafedroy - prof.  
V.K.Beletskiy) Ryazanskogo meditsinskogo Instituta imeni Pavlova.

EXCERPTA MEDICA Sec 20 Vol 2/12 Gerontology Dec 59

1644. The change of the absorptive properties of certain tissues of white mice with advanced age (Russian text) KIRILLOVA I. V. and POPOVA Z. B. \* A. A. Zhdanov Leningrad St. Univ., Leningrad *Byull. Eksp. Biol. i Med.* 1959, 47:4 (112-116) Graphs 3 Tables 3

The changes in the absorptive properties of the muscular, nervous, epithelial and connective tissues of white rats were studied in old animals. The quantitative method of vital staining was used for evaluation of the absorptive properties of these tissues. Both basic and acid stains were used. It was established and statistically confirmed that the absorptive properties of the muscles, brain, cornea and proteins of the blood serum are increased with age, which points to the qualitative changes in the proteins of various tissues. A suggestion is made of the denaturing origin of these changes.

\* Chair fiziologii cheloveka i zhivotnykh.  
Lab fiziologii bitkii

KIRILLOVA, I.V.

Mechanical interpretation of folding. Trudy Inst.teor.geofiz. 3:  
85-93 '47. (Folds (Geology)) (MIRA 9:9)

KIRILLOV I. V.

March 1947

USSR/Geology  
Stratification

"Fundamental Problems of Folding Mechanism," V. I. Belousov (with participation of I. V. Kirillov, N. A. Rozanov, A. M. Goryachova), 26 pp

"Byull Moskov obsh Isp Pri, Nova Ser, Otol Geol" Vol XXII, No 3

Kinematic mechanism of folding depends more on redistribution of plastic rocks than on harder interlayers. Because the flow of different rock layers varies in intensity, the material presses out to form the crest and troughs of a fold. The greater the plasticity, the deeper the fold. Such deformation produces cleavage of several types: main cleavage (parallel to axial surfaces of the fold); fanlike (converging along anticlines); the S-like (curving of main cleavage); dynamic (curving of separate layers); and transverse cleavage. Further decrease of the deformation plasticity and sliding concentration results in the formation of paraclases and disclases.

PA 49T28

KIRILLOVA, I. V.

Cand Geolog-Mineralog Sci

Dissertation: "Certain Problems of the Mechanism of Folding"

25 Feb 49

Inst of Geological Sci, Acad Sci USSR

80 Vecheryaya Moskva  
Sum 71

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KIRILLOVA, I.V.

"Some problems of the mechanics of folding", Trudy Geofizichesk. in-ta AN SSSR,  
[Papers of the Geophysical Institute of the Academy of Sciences of the USSR],  
Vol. 6, 1949.

KIRILOVA, I. V.

USSR/Geophysics - Seismology Sep/Oct 52

"Brief Survey of the Seismicity of the Caucasus  
In Comparison With Its Tectonic Structure,"  
V. V. Belousov, I. V. Kirilova, A. A. Boriskiy,  
Geophys Inst, Acad Sci USSR

"Iz Ak Nauk SSSR, Ser Geofiz" No 5, pp 3-9

Authors conclude that epicenters of earthquakes  
are coordinated to zones sep highlands and  
lowlands and also to transverse belts coincid-  
ing with the transverse anticlinal folds in the

226r60

General structure of the Caucasus. Western Caucasus  
has less seismic activity than eastern Caucasus.  
Received 17 Jun 52.

226r60

KIRILLOVA, I. V.

USSR/Geophysics - Seismology

Sep/Oct 52

"Seismicity of Akhal'kalaki Highlands," I. V. Kirillova, Geophys Inst, Acad Sci USSR

"Iz Ak Nauk SSSR, Ser Geofiz" No 5, pp 10-23

Gives a survey of all available data on seismic epicenters of Akhal'kalaki Highlands. Describes results of observation at temporary seismic stations of the Caucasian geophys expedition GEOPIAN in 1950. Compares seismic data with tectonic conditions and derives corresponding conclusions. Received 1 Feb 52.

226761

KIRILLOVA I.V.: SORSKIY A.A.

Geology - Transcaucasia, Eorlogy, Structural

"Baskal'skii" blanket in eastern Transcaucasia. Dokl. AN SSSR 83 No5, 1952  
Geofizicheskiy Institut Akademii Nauk SSSR rcd. 20 Feb. 1952

SO: Monthly List of Russian Accessions, Library of Congress, August 1952 ~~1952~~, Uncl.

*KIRILLOVA, I. V.*

Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 1, pp 34-35 (USSR) 15-57-1-247

AUTHORS: Sorskiy, A. A., Kirillova, I. V.

TITLE: Some New Data on the Tectonics of Southeastern Caucasus (The problem of the Baskal'skiy Blanket Layer) [Nekotoryye novyye dannyye po tektonike Yugo-Vostochnogo Kavkaza (K voprosu o Baskal'skom pokrove)]

PERIODICAL: Sov. geologiya, Nr 41, 1954, pp 102-114

ABSTRACT: The authors, in order to prove further their previously expressed views (Dokl. AN SSSR, 1952, Vol 33, Nr 5), present more complete data on the tectonics of the region of the so-called Baskal'skiy blanket deposit which lies between the Gerdyman-Chay and the Akhsu Rivers to the south of the Vandam anticlinorium. The views of N. B. Vassoyevich and V. Ye. Khain (Izv. AN SSSR, ser. geol., 1940, Nr 1) on the subject of the

Card 1/4

Some New Data on the Tectonics (Cont.)

15-57-1-247

surface structure of the region are presented briefly. The authors note the poor exposure and the wide distribution of landslides. The folds are similar in their trend to those elsewhere in the Caucasus: anticlines, as is usually the case, are compressed and narrow, the synclines are broad and flat. The faults are in the form of steep thrusts and are usually found in the north, but sometimes also in the south. The contact of the Upper Cretaceous Yamugadskaya and Il'khidag'skaya series with the Maykop clays, located to the south of the Nialdag'skiy Pass, lies along the fault line of one such steep thrust which dips to the south. This contact is taken to represent a rear border of the blanket deposits, but the proofs for this assumption are insufficient. A small anticline was located farther to the south; on its northern limb lie two mud volcanoes with their extruded materials containing the microfauna of the "koun". According to Vassoyevich, the vent in one of these volcanoes cuts through the Cretaceous strata of the blanket and reaches downward into the autochthonous Paleogene. If such is the case, then it is impossible

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Some New Data on the Tectonics (Cont.)

15-57-1-247

to understand why the extruded material contains only Paleogene microfauna and shows a complete absence of the Cretaceous fauna, even though the Yanusdagskaya and Il'khidagskaya clays are full of microfauna. It is more logical to assume that in the vicinity of the volcano the Cretaceous rocks are covered by the Paleogene, and that the materials from the latter were extruded by the pulsating volcano. The unconformable sequence of Upper Cretaceous rocks, lying on the Maykop in the lower course of the Sulut-Chay River, is explained by the authors as the expression of an overthrust caused by an overthrown anticlinal fold, and not as the rear edge of the blanket deposit. The supposition as to the blanket structure of the Baskal'skiy region used to be based also on the alleged similarity of the Upper Cretaceous section in this region to the section of the flysch zone lying to the north of the Kakhetinsko-Vandamskaya geoanticlinal zone, in which the Upper Cretaceous section is substantially different. But the Baskal'skiy region is not a part of the Vandamskaya zone, but is contained in the intrageosynclinal

Card 3/4

Some New Data on the Tectonics (Cont.)

15-57-1-247

inskaya  
Izmail subzone, the section of which may be very similar to that of the Dibrarskiy section. Moreover, the authors have found the Sarmatian and the Pontian deposits in the synclines of the "blanket". This negates the possibility of the overthrust having originated in the post-Pontian time out of the Dibrarskaya zone, which represented the region of erosion in both the Sarmatian and the Pontian time. The authors further discuss briefly possible conditions under which the overthrust might have been produced and finally conclude that the assumption of the overthrust structure of the Baskal'skiy region is erroneous.  
Card 4/4

D. A. T.



*KIRILLOVA, I.V.*  
USSR/Geophysics - Structural geology

FD-2585

Card 1/1            Pub. 44 15/19

Author            : Kirillova, I. V.; Sorskiy, A. A.; Ez, V. V.

Title             : ~~Letter to the editor~~  
Letter to the editor

Periodical        : Izv. AN SSSR, Ser. geofiz, Jul-Aug 55, 389-390

Abstract          : The author found very interesting and urgent the article of G. I. Gurevich "So-called mechanical analysis in geological literature", which tries to show how geologists apply data of the exact sciences to the solution of certain problems of structural geology and from what principles they proceed. G. I. Gurevich clearly discloses the intolerable position created in the exposition and application of methods of mechanics and physics, and consequently also in the USSR; he clearly shows that the pseudoscientific "principles" of the mechanics of the deformable body, which are expounded in many words on structural geology, can find no application in geological practice, since they comprise only a scientific-like terminological shell in many works. The present author cannot agree with the assertion of the editors of this journal that G. I. Gurevich in effect accuses Soviet geologists with "knowingly prefraining from the intelligent use of methods of physics and mechanics."

Institution      :

Submitted        :

KIRILLOVA, I. V.

USSR/Physics of the Earth - Seismology, 0-3

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 36369

Author: Kirillova, I. V.

Institution: Geophysical Institute, Academy of Sciences USSR, Moscow

Title: Concerning the Problem of Averaging the Epicenters Maps

Original

Periodical: Tr. Geofiz. in-ta AN SSSR, 1955, No 30, 123-126

Abstract: Seismicity maps, in which the epicenters are represented by points, have many shortcomings; it is difficult to take into account the accuracy of the determination of the epicenters; the points merge in many portions; it is too difficult to compare by eye the number of epicenters in different regions, etc. It is suggested that the maps show the isographs of the epicenter density, i.e., their number is a square, the size of which is not less than the error and the determination of each epicenter. In order to average statistically the data, it is necessary to calculate the densities in the overlapping squares (for example, for each corner of the

Card 1/2

USSR/Physics of the Earth - Seismology, 0-3

"APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000722710004-8"

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 36369

Abstract: Square grid it is necessary to determine the number of epicenters in all the adjacent squares). A map is plotted for the density of the epicenters of the Caucasus. It is visually clearer than the maps showing point epicenters (although it does not fully supersede it) and, in particular, makes it easier to display the variation in seismicity with time.

Card 2/2

KIRILLOVA, I. V.

USSR/ Geology

Card/1

Pub. 22 - 39/52

Authors :

Sorskiy, A. A., and Kirillova, I. V.

Title :

Tectonic division of folded regions

Periodical :

Dok. AN SSSR 100/2, 347-349, Jan 11, 1955

Abstract :

The problem of preparing tectonic maps of folded regions of the central part of western Caucasus is discussed. A method of drawing such tectonic maps is described. Five USSR references (1930-1954). Map.

Institution :

Academy of Sciences USSR, Geophysics Institute

Presented by :

Academician N. S. Shatskiy, October 11, 1954.

BELOUSOV, V.V., red.; ~~KIRILLOVA, I.V.~~ [translator]; SORSKIY, A.A. [translator];  
ROMANOVICH, G.P., red.; BELOVA, M.A., tekhn. red.

[Problems in experimental tectonics; a collection of articles]  
[Translated from the English] Voprosy eksperimental'noi tektoniki;  
sbornik statei. S predisl. V.V. Belousova. Moskva, Izd-vo inostr.  
lit-ry, 1957. 190 p. (MIRA 11:7)

(Petroleum geology)

*KIRILLOVA, I.V.*

GOTSADZE, O.D.; ~~KIRILLOVA, I.V.~~ MOGAN, S.D.; KUKHTIKOVA, T.I.;  
MALINOVSKAYA, L.N.; SORSKIY, A.A.; KEYLIS-BOROK, V.I.,  
doktor fiziko-matematicheskikh nauk, otvetstvennyy redaktor;  
ZAYTSEV, L.P., redaktor isdatel'stva; EZ, V.V., redaktor  
isdatel'stva; SHEVCHENKO, G.N., tekhnicheskii redaktor.

[Investigation of the mechanism of earthquakes] Issledovanie  
mekhanizma zemletriaseni. Moskva, Izd-vo Akademii nauk SSSR,  
1957. 148 p. (Akademia nauk SSSR. Geofizicheskii institut.  
Trudy, no.40).

(Seismology)

(MIRA 10:10)

Kirillova, I. V.

AUTHOR Kirillova, I.V. 20-4-39/60

TITLE On the Periodicity of Destructive Earthquakes in the Caucasus and in Turkey.  
(O periodichnosti razrushitel'nykh zemletryaseniy Kavkaza i Turtsii.)

PERIODICAL Doklady Akademii Nauk SSSR, 1957, Vol. 115, Nr 4, pp. 771-773 (USSR).

ABSTRACT This problem is highly interesting as well in connection with the earthquake forecast as for the solution of the problem of the cause of the earthquakes and the character of the tectonic processes with which they are connected. In order to obtain a correct conception of the periodicity, seismostatistic data for a long period of time are necessary. These exist for the Caucasus since the year 139, and for the neighboring Asia Minor since the 3rd century B.C. From published data the author compiled distribution diagrams of the destructive earthquakes of these two regions (fig.1). In these diagrams the curves a and b show a peculiar rhythm which manifests itself in the fact that the number of these earthquakes sometimes rises periodically and then again decreases. The maxima and minima are not stable in their numerical expression. Apart from the numerical

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On the Periodicity of Destructive Earthquakes in the Caucasus and in Turkey.

20-4-39/60

values, however, a qualitative examination shows that the minima and maxima are separated by periods of about 2,5 - 3 centuries. The curves of the earthquakes in the Caucasus and in Asia Minor are in a fairly good correlation with each other. It is not yet possible to determine the period of the reiteration of earthquakes at one and the same place very accurately according to the present material. Nevertheless it makes it possible to form an opinion on a certain rhythm of the seismic activity in the course of time. Since the earthquakes are connected with the regions of intensive vertical movements of the earth's crust and since they manifest a peculiar cyclicity, the thought arises that a connection might exist between the seismic activity of the region and the movements of the earth's crust. These latter influence the level of the Caspian Sea for which very abrupt displacements as far out as 16 m were found to have taken place during the last 800 years (cf. Voznesenskiy). The comparison of the curves of variations in the water level (fig. 2 b) with that of

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On the Periodicity of Destructive Earthquakes in the Caucasus and in Turkey. 20-4-39/60

the average number of destructive earthquakes within a century does not yield any such agreement as fig.1. It may apparently be stated that the maxima of the seismic activity correspond to the periods of minima of the Caspian level or precede them with an accuracy up to 1 century. The elevation of the neighboring meg-anticlinorium of the Great Caucasus or the deflection of the Caspian depression may be the geological cause of the Caspian level near Baku. The periodic variations of the Caspian level have recently been brought into connection with similar variations of the sun's activity. According to the author this does not exclude the existence of the above-mentioned relations. Turner determined a similar periodicity for the Chinese earthquakes. Turner's periods of 240, 260 and 284 years are compared with the minima and maxima of the stagnation of the Nile and the intensity of growth of the Californian sequoia, and by recalculations connected with the motions of the poles. A very essential indication for the fact that the seismic

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20-4-39/60

On the Periodicity of Destructive Earthquakes in the Caucasus and in Turkey.

activity is connected with tectonic variations is the fact that the maxima of the seismic activity of Northern China correspond to the Minima of Southern China in the same periodicity.

There are 2 figures and 6 Slavic references.

ASSOCIATION:

Institute for Geophysics AN USSR

(Institut fiziki Zemli Akademii nauk SSSR)

PRESENTED:

By N.M. Strakhov, Academician, March 11, 1957

SUBMITTED:

September 4, 1956.

AVAILABLE:

Library of Congress.

CARD 4/4

DYBOVSKAYA, Irma Konstantinovna, dotsent, kand.filologicheskikh nauk;  
KIRILLOVA, I.V., kand.geologo-mineralog.nauk, red.; MANOLE, M.G.,  
red.; GAVRILOV, S.S., tekhn.red.

[French-Russian geological dictionary] Frantsuzsko-russkii  
geologicheskii slovar'. Pod red. I.V. Kirillovoi. Moskva, Gos.  
izd-vo fiziko-matem. lit-ry, 1958. 406 p. (MIRA 12:2)  
(French language--Dictionaries--Russian)  
(Geology--Dictionaries)

KIRILLOVA, I.V.; LYUSTIKH, Ye.N.; RASTVOROVA, V.A.; SORSKIY, A.A.;  
KHAIN, V.Ye.; BELOUSOV, V.V., otv.red.; EZ, V.V., red.isd-va;  
RYLINA, Yu.V., tekhn.red.

[Analysis of the geotectonic development and seismicity of  
the Caucasus] Analiz geotektonicheskogo razvitiia i seismich-  
nosti Kavkaza. Moskva, Izd-vo Akad.nauk SSSR, 1960. 339 p.  
(MIRA 13:10)

1. Chlen-korrespondent AN SSSR (for Belousov).  
(Caucasus--Geology, Structural) (Seismology)

