ACCESSION NR: AP4022946

AUTHOR: Vishik, M. I.; Eskin, G. I.

TITLE: Boundary value problems for general singular equations [illegible]

SOURCE: AN SSSR. Doklady*, v. 155, no. 1, 1964, 24-27

TOPIC TAGS: singular integral, integral equation, singular equation, boundary value problem, elliptic equation, analysis, integrodifferential equation, theory of functions

ABSTRACT: An equation of the type

$$K\varphi \equiv K_\alpha\varphi + T\varphi \equiv \int_G K_\alpha(x, x-y)\varphi(y)\,dy + \int_G T(x, y)\varphi(y)\,dy = F(x), \quad (1)$$

where $x \in G$ is examined in a bounded domain $G \subset R^n$ with sufficiently smooth boundary Γ. In this particular case, $K_\alpha(x,z)$ and $T(x,z)$ are generalized functions with respect to z, smoothly dependent upon x, and the integrals in (1) are understood in the sense of the theory of generalized functions. The following conditions are assumed: (a) $K_{\alpha\xi}(x, \xi)$, and (b) that the analogue of ellipticity condition $K_\alpha(x, \xi) \neq 0$ for all $\xi \neq 0$, $x \in G \cup \Gamma$, is fulfilled. When $\alpha = 0$, the equation

Card 1/3

ACCESSION NR: AP4022946

is a singular integral equation in the bounded space G. In p... (1) can be an elliptic differential equation. However, equat... ses elliptic integral differential equations and the case ... rational function with respect to ξ. The first homogeneous ... lem is to find a solution to equation (1) from $H_{(x)}$. The ... maps $H_{(x)}$ in $H_{(x)-\alpha}$. The operator $K = K_\alpha + T$ is the Φ ... $H_{(x)-a}$ when conditions (a) and (b) are fulfilled. Under these ..., equation (1) is normally soluable and the estimate

$$\|\varphi\|_{(x)} \leq C\,\|G\|_{(x)-\alpha} + \|\varphi\|_{(x)-1}, \quad \varphi \in H^{0}_{(x)},$$

holds true.

The nonhomogeneous first boundary value problem is normally solv... i.e. the operator $K_\varphi = (F, f(x))$ is the Φ-operator from $H_{(x)}$ (R^n) into $[H_{(x)-\alpha}(G), H_{(x)}(R^n \setminus G)]$. Analogous methods were used to ... system of singular equations and their application to boundary value probl... with discontinuous boundary conditions. All the results were transferred to the case of singular equations of the parabolic type. In this particular case, general mixed boundary value problems were studied. Orig. art. has: 12 equations.

Card 2/3

ACCESSION NR: AP4022946

ASSOCIATION: none

SUBMITTED: 06Nov63 ENCL: 00

SUB CODE: MA NO REF SOV: 006 OTHER: 00

Card 3/3

ACCESSION NR: AP4036709 S/0020/64/156/002/0243/0246

AUTHOR: Vishik, M. I.; Eskin, G. I.

TITLE: Singular elliptic equations and systems of variable series

SOURCE: AN SSSR. Doklady*; v. 156, no. 2, 1964, 243-246

TOPIC TAGS: closed manifold, singular elliptic equation, variable series, space function, boundary value, finite region, complementary potential, Fourier conversion

ABSTRACT: The authors studied equations representing a closed manifold and the space function of a variable series of evenness. The boundary value problem for singular elliptic equations in a finite region was examined, where the finite region was equated by $G \subset R^n$ having a smooth boundary. Problems with complementary potentials were investigated using

$$L_{\alpha(x)}\left(u(x) + \sum_{k=1}^{M} G_k g_k(x')\right) = f(x),\ x \in G,\ x' \in \Gamma \qquad (8)$$

Orig. art. has: 12 equations and 5 theorems.

Card 1/2

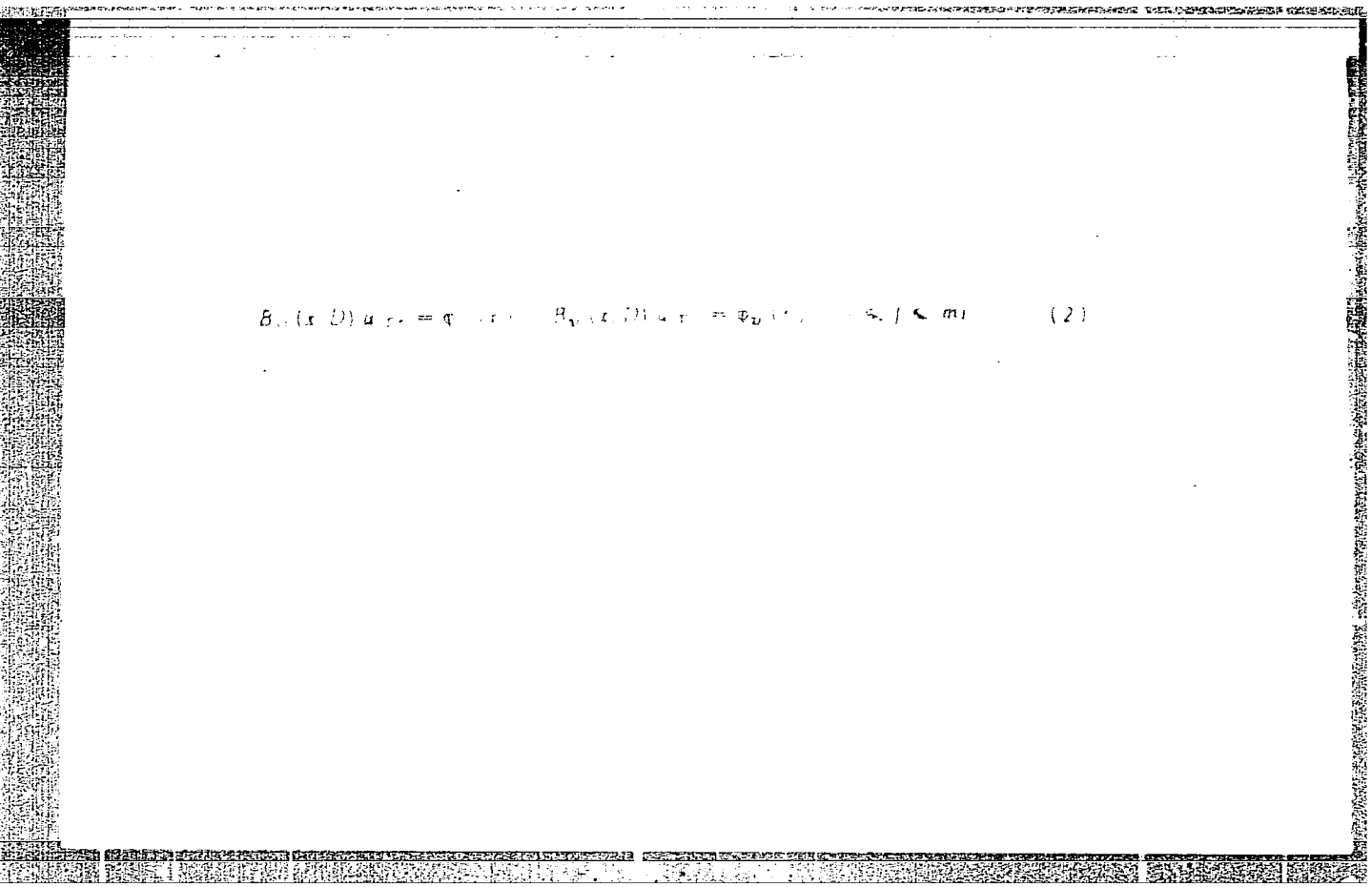
ACCESSION NR: AP4036709

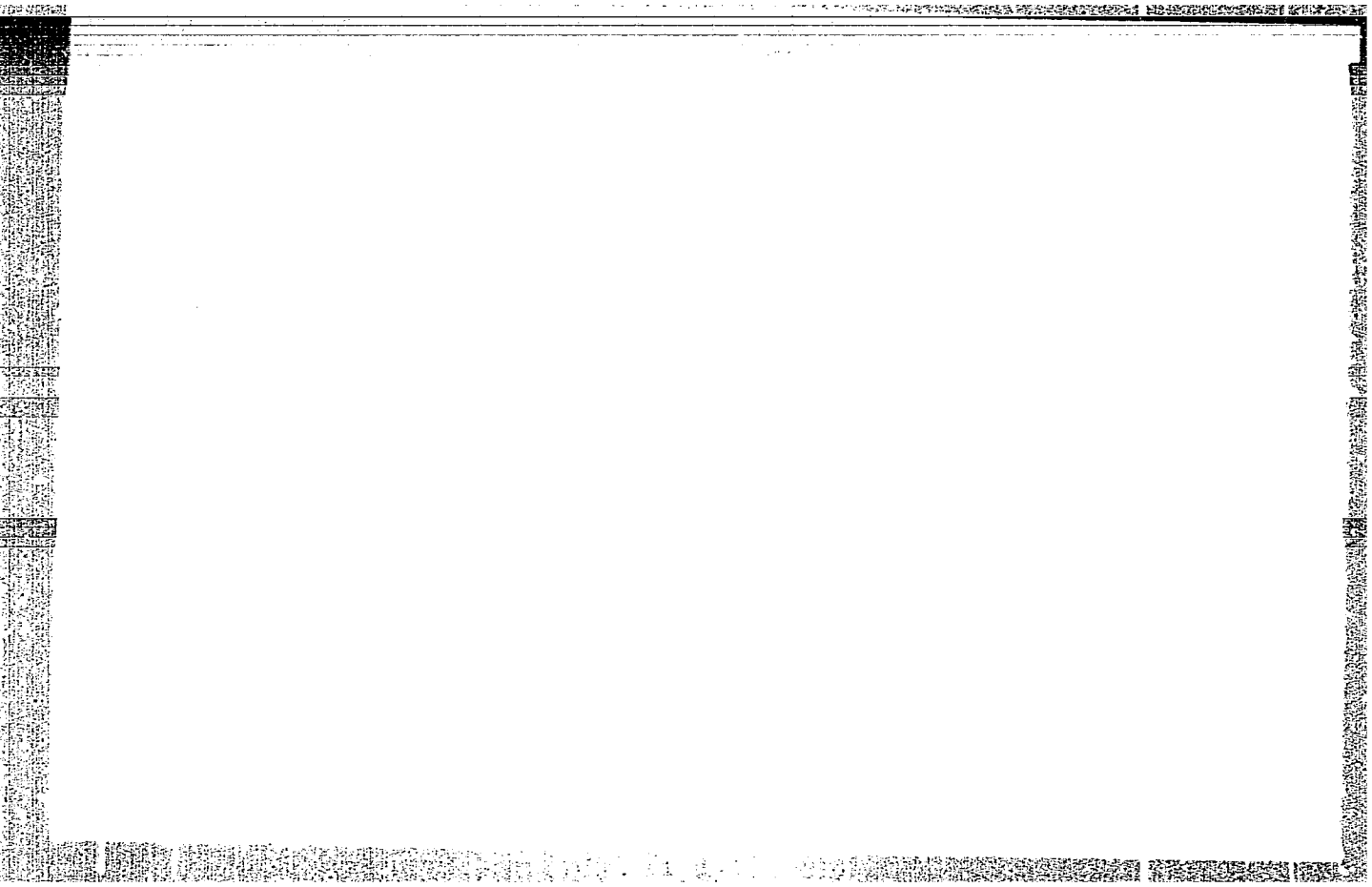
ASSOCIATION: none

SUBMITTED: 11Jan64	DATE ACQ: 03Jun64	ENCL: 00
SUB CODE: MA	NO REF SOV: 003	OTHER: 000

Card 2/2

tial equation of order 2n. 2. Systems of paired equations. 3. Gen-





APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001860030001-2"

VISHIK, M.I.; ESKIN, G.I.

Singular elliptic equations and systems of variable order.
Dokl. AN SSSR 156 no. 2:243-246 My '64. (MIRA 17:7)

1. Predstavleno akademikom I.G.Petrovskim.

VISHIK, M.I. (Moskva); ESKIN, G.I. (Voronezh)

Equations in convolutions in a bounded region in spaces with weight norms. Mat. sbor. 69 no.1:65-110 Ja '66.
(MIRA 19:1)

1. Submitted July 12, 1965.

VISHIK, M.I.; ESKIN, G.I.

Convolution equations in a bounded region. Usp. mat. nauk 20 no.3: 89-152 My-Je '65. (MIRA 18:6)

VISHIK, M.I.; NOVIKOV, S.P.; POSTNIKOV, M.M.

Meetings of the Leningrad Mathematical Society. Usp. mat. nauk 19 no.6:229-236 N-D '64 (MIRA 18:2)

Gorkiy Mathematical Seminar on Homotopic Topology. Ibid.:237-238

AGRANOVICH, M.S.; VISHIK, M.I.

Elliptic problems with a parameter and parabolic problems of a general type. Usp. nat. nauk 19 no.3:53-161 My-Je '64. (MIRA 17:10)

VISHIK, M.I.; [illegible]

Izrail' Moiseevich Gel'fand, 1913- ; on his 50th birthday.
Usp. mat. nauk 19 no.3:187-205 My-Je '64.
(MIRA 17:10)

VISHIK, M.I.; ESKIN, G.I.

General boundary value problems with discontinuous boundary conditions. Dokl. AN SSSR 158 no.1:25-28 S-O '64 (MIRA 17:8)

1. Predstavlena akademikom I.G. Petrovskim.

VISHIK, M.I.; ESKIN, G.I.

Boundary value problems for general singular equations in a bounded region. Dokl. AN SSSR 155 no.1:24-27 Mr '64. (MIRA 17:4)

1. Predstavleno akademikom I.G.Petrovskim.

VISHIK, M.I.

Quasi-linear strongly elliptic systems of differential equations of divergent form. Trudy Mosk. mat. ob-va 12:125-184 '63. (MIRA 16:11)

VISHIK, M.I. (Moskva)

Solvability of boundary value problems for quasi-linear parabolic equations of higher order. Mat. sbor. 59 (dop.):289-325 '62.
(MIRA 16:6)

(Boundary value problems)
(Differential equations, Linear)

VISHIK, M.I.

Solvability of the first boundary value problem for quasi-linear equations with rapidly increasing coefficients in Orlicz classes. Dokl. AN SSSR 151 no.4:758-761 Ag '63. (MIRA 16:8)

1. Predstavleno akademikom I.G.Petrovskim.
(Boundary value problems) (Linear equations)

VISHIK, M.I.

Solvability of the first boundary value problem for certain nonlinear elliptic systems of differential equations. Trudy MEI no.42:3-17 '62. (MIRA 16:7)

(Boundary value problems) (Differential equations)

AGRANOVICH, M.S.; VISHIK, M.I.

Elliptic boundary value problems depending on a parameter. Dokl. AN SSSR 149 no.2:223-226 Mr '63. (MIRA 16:3)

1. Predstavleno akademikom I.G.Petrovskim.
(Boundary value problems)

VISHIK, M.I.

Quasi-linear elliptic systems of equations containing subordinated terms. Dokl.AN SSSR 144 no.1:13-16 My '62. (MIRA 15:5)

1. Predstavleno akademikom S.L.Sobolevym.
(Differential equations, Linear)

VISHIK, M.I.

Boundary value problems for quasi-linear parabolic systems of equations and Cauchy's problem for hyperbolic equations. Dokl. AN SSSR 140 no.5:998-1001 O '61. (MIRA 15:2)

1. Predstavleno akademikom S.L.Sobolevym.
(Boundary value problems)
(Differential equations)

S/020/62/144/001/001/024
B112/B102

AUTHOR: Vishik, M. I.

TITLE: Quasilinear elliptic systems of equations containing subordinated terms

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 144, no. 1, 1962, 13-16

TEXT: The boundary value problem

$$L(u) = \sum_{|\alpha| \leq m} (-1)^{|\alpha|} D^{\alpha} A_{\alpha}(x, D^{\gamma}u) = h, \quad x \in G, \tag{1}$$

$$u|_{\Gamma} = \varphi_0(x'), \ldots, D^{\omega}u|_{\Gamma} = \varphi_{\omega}(x'), \quad x' \in \Gamma, \ |\omega| \leq m - 1 \tag{2}$$

is considered under certain conditions concerning $A_{\alpha} = (A_{\alpha}^{1}, \ldots, A_{\alpha}^{N})$, where $\alpha = (\alpha_1, \ldots, \alpha_n)$. It is demonstrated that the boundary value problem (1) and (2) can be solved unambiguously. This result is generalized for operators M(u) with subordinated terms.

PRESENTED: December 29, 1961, by S. L. Sobolev, Academician

SUBMITTED: December 26, 1961

Card 1/1

20109
S/020/61/140/005/004/022
C111/C222

16.3500

AUTHOR: Vishik, M. I.

TITLE: Boundary value problems for quasilinear parabolic systems of equations and Cauchy's problem for hyperbolic equations

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 5, 1961, 998-1001

TEXT: The author investigates the mixed boundary value problem for quasilinear parabolic systems of equations:

$$Mu \equiv \frac{\partial u}{\partial t} + \sum_{|\alpha|,|\gamma| \leq m} (-1)^{|\alpha|} D_\alpha A_\alpha (x,t,D_\gamma u) \equiv \frac{\partial u}{\partial t} + L(u) = h, \quad (1)$$

$$u\big|_{t=0} = \Psi(x), \; u\big|_\Gamma = \varphi(x',t), \ldots, \; D_\omega u\big|_\Gamma = \varphi_\omega (x',t), \quad (2)$$

where $x = (x_1,\ldots,x_n)$, $u = (u^1,\ldots,u^N)$, $h = (h^1,\ldots,h^N)$, $D_\alpha = \partial^{|\alpha|} / \partial x_{\alpha_1} \ldots \partial x_{\alpha_n}$, $|\alpha| = \alpha_1 + \ldots + \alpha_n$, $x' \in \Gamma$, $|\omega| \leq m-1$

Card 1/4

Γ -- boundary of a region G, $0 < t < T$, and L(u) for all t, $0 < \tau < T$, is a strongly elliptic operator in the sense of (Ref. 1, M.J. Vishik, DAN 138, no. 3, 1961). Here in contrary to (Ref.1) instead of the definiteness of L(u) the author demands only the semiboundedness of its variation. It is shown (theorem 1) that if (2) and h(x,t) satisfy certain conditions of smoothness then the problem (1), (2) has a unique solution in a corresponding space.

In the second part of the paper the author considers the hyperbolic equation

$$a(u) = h \qquad (12)$$

of the order m+1 being normal in the sense of J. G. Petrovskiy (Ref.4, Matem. sborn., 2(44), 5(1937)), where the coefficient of $\partial^{m+1}u/\partial t^{m+1}$ equals one. Choosing the initial conditions

$$u\big|_{t=0} = 0, \ldots, \partial^m u/\partial t^m\big|_{t=0} = 0 \qquad (13)$$

then, according to Petrovskiy (Ref.4) it suffices to prove the existen-

Boundary value problems for . . .

ce of a solution of (12), (13) for periodic boundary conditions

$$D_\beta u\big|_{x=0} = D_\beta u\big|_{x=2\pi}, \quad |\beta| \leq m . \qquad (14)$$

The existence of a solution of (12), (13), (14) is proved with the aid of a method similar to the method of Galerkin by seeking the approximate solution $u_r(x,t) = \sum C_{\alpha r}(t)\, z_\alpha(x)$, where $\alpha (\alpha_1, \ldots, \alpha_n)$, $|\alpha| \leq r$, $r = 1,2,\ldots$, $z_\alpha(x) = \exp i (\alpha_1 x_1 + \ldots + \alpha_n x_n)$. The coefficients $C_{\alpha r}$ are determined so that it holds

$$\left[\varphi(t)a(u_r),\ b(z_\gamma(t)d_\gamma(t))\right] = \left[\varphi(t)h(x,t),\ b(z_\gamma(x)d_\gamma(t))\right], |\gamma| \leq r, \quad (15)$$

where $b(u) = \partial a(u)/\partial D_t u$, $\varphi(t) = e^{-\lambda t} - e^{-\lambda T} (0 < t < T)$, λ -- sufficiently large number, $d_\gamma(t)$ -- smooth functions which for $t = 0$ satisfy the conditions (13). For $C_{\alpha r}(t)$, the condition (15) leads to a boundary value problem having a unique solution for sufficiently large λ (lemma 2). It is shown that the sequence of approximations

Card 3/4

$u_r(x,t)$ obtained in this way converges to the solution $u(x,t)$ of (12) - (14) (theorem 2).

There are 4 Soviet-bloc and 1 non-Soviet-bloc reference. The reference to the English-language publication reads as follows: J. Leray, Lectures on hyperbolic equations with variable coefficients. Princeton, 1952.

PRESENTED: May 22, 1961, by S. L. Sobolev, Academician

SUBMITTED: May 16, 1961

21553
S/020/61/137/003/001/030
C111/C222

16.3500

AUTHOR: Vishik, M.I.

TITLE: Solution to a system of quasilinear equations having a divergent form under periodic boundary conditions

PERIODICAL: Akademii nauk SSSR. Doklady, vol.137,no.3,1961, 502-505

TEXT: The author proves theorems of existence and uniqueness for solutions of systems of quasilinear equations the principal terms of which are written in a divergent form. The given boundary conditions are periodic.
Given the system

$$\sum_{|\alpha|\le m,\ |\beta|\le m} (-1)^{|\alpha|} D_\alpha A_\alpha(x,u,D_\beta u)+B(x,u,D_\beta u) = h(x), \qquad (1)$$

where $x = (x_1,\ldots,x_n)$, $D_\alpha = \partial^{|\alpha|}/\partial x_1^{\alpha_1}\ldots\partial x_n^{\alpha_n}$, $\alpha=(\alpha_1,\ldots,\alpha_n)$, $|\alpha| = \alpha_1+\ldots+\alpha_n$; $u = (u^1,\ldots,u^N)$, $h=(h^1,\ldots,h^N)$, $A_\alpha(\ )$ and $B(\ )$ assume vector values of R^N, where $A_\alpha(x,0,0) = B(x,0,0) = 0$. A_α and B are continuously differentiable with respect to all arguments in $x \in G$,

Card 1/5

Solution to a system...

$G = (0 \leq x_i \leq 2\pi)$, $-\infty < u, D_\beta u < +\infty$. Let the boundary conditions be

$$u|_{x_i=0} = u|_{x_i=2\pi}, \quad D_\alpha u|_{x_i=0} = D_\alpha u|_{x_i=2\pi} \quad (i=1,\ldots,n). \qquad (2)$$

The basic assumption reads

$$l_1(u) \equiv [A_\alpha(x,u,D_\beta u), \ D_\alpha u] + [B(\ ), \ u] \geq c^2 \|u\|^{1+\delta}, \qquad (3)$$

where $\delta > 0$, $\| \ \|$ -- norm in the L_2 or L_p, $[,]$ -- scalar product of vector functions, $u(x) \in P^{2m}$, i.e. $u(x)$ is an arbitrary function of $C^{2m}(G)$ which satisfies (2); it is summed over equal indices.
The approximate solution is sought according to the method of Galerkin in the form $u_i = \sum_{|\varkappa| \leq i} C_\varkappa u_\varkappa$, where $u_\varkappa = e^{i(k_1x_1+\ldots+k_nx_n)}$, $\varkappa = (k_1,\ldots,k_n)$ is an integral vector, and $|\varkappa| = |k_1|+\ldots+|k_n|$. The $C_\varkappa$ are determined from

$$K(u_i,u_\varkappa) \equiv [A_\alpha(x,u_i,D_\beta u_i), D_\alpha u_\varkappa] + [B(\ ), \ u_\varkappa] = [h,u_\varkappa] \quad (|\varkappa| \leq i). \qquad (5)$$

It is proved that (5) has at least one solution $\{C_\varkappa\}$. The possibility

Solution to a system...

of the limiting process and the existence of the solution of (1),(2) require the conditions:

Condition R: For every s, $1 \leq s \leq n$ it holds

$$l_2(u) \equiv \left[\frac{\partial}{\partial x_s} A_\alpha(x,u,D_\beta u), D \frac{\partial u}{\partial x_s} \right] + \left[\frac{\partial}{\partial x_s} B(\ ), \frac{\partial u}{\partial x_s} \right] \geq \tag{9}$$

$$\geq \gamma^2 \sum_j \sum_{|\alpha|=m} \left[|D_\alpha u^j|^{r_j} D_\alpha \frac{\partial u^j}{\partial x_s}, D_\alpha \frac{\partial u^j}{\partial x_s} \right] + \ldots - f_1(l_1(u)),$$

where $u \in P^{2m}$, the points ... mean an analogous sum for $|\alpha| < m$ which may be missing; $r_j \geq 0$, f_1 is a monotone function.

Condition P. For a certaion $p > 1$, f_2 and f_3 it holds

$$l_3(u) \equiv \sum_{|\alpha| \leq m} \| A_\alpha(x,u,D_\beta u) \|_p + \| B(\ ) \|_p \leq f_2(l_1(u)) + f_3(l_2(u)), \tag{10}$$

where $\| \ \|_p = \| \ \|_{L_p}$, where for $|\alpha| = m$ and a certain $p_1 > 1$ it holds

Card 3/5

Solution to a system...

$$\| D_\alpha u \|_{p_1} \leq f_4(l_1(u)) + f_5(l_2(u)). \qquad (10')$$

Generally (3) follows from R and P.

Theorem 1: If R,P and (3) are satisfied then for every $h(x) \in \Phi_\gamma$ (cf.Ref.2: M.I.Vishik, DAN 134, no.4 (1960); Ref.5: P.Lax, Com.Pure and Appl.Math, 8, 615 (1955); Ref.6: J.L.Lions, Acta Math., 98, 1-2, 13 (1955)) there exists at least one solution u(x) of the problem (1),(2). Here the norms at the left-hand of (10) and (10') are finite, and for every $v \in W_q^{(m)}(G)$, $1/q+1/p = 1$ it holds the relation

$$K(u,v) = (h,v) \qquad (11)$$

(cf.notation (Ref.5)).

The proof is performed by a limiting process in (5).

Theorem 2: If for a certain p_1 there holds the estimation

$$\| \partial A_\alpha(x,w,D_\beta w)/\partial x_s \|_p + \| \partial B(\ )/\partial x_s \|_p \leq f_6(l_2(u)) + f_7(l_1(u)) \qquad (18)$$

for arbitrary $w \in P^{2m}$ then the constructed solution u has finite norms of the derivatives given at the left-hand side.

Theorem 3 asserts that the constructed solution is unique in the class

Card 4/5

21553

S/020/61/137/003/001/030
C111/C222

Solution to a system...

of functions with finite forms $l_1(u)$ and $l_2(u)$.

The author mentions S.L.Sobolev. There are 8 Soviet-bloc and 2 non-Soviet-bloc references. The reference to the English-language publication reads as follows: P.Lax, Com. Pure and Appl.Math., 8, 615 (1955).

ASSOCIATION: Moskovskiy energeticheskiy institut (Moscow Power Engineering Institute)

PRESENTED: October 28, 1960, by I.G.Petrovskiy, Academician

SUBMITTED: October 27, 1960

Card 5/5

ALEKSANDROV, P.S.; VISHIK, M.I.; SAUL'YEV, V.K.; EL'SGOL'TS, L.E.

Lazar' Aronovich Liusternik; on his 60th birthday. Usp. mat. nauk 15 no.2:215-230 Mr-Ap '60. (MIRA 13:9)
(Liusternik, Lazar' Aronovich, 1899-)

VISHIK, M.I.; LYUSTERNIK, L.A.

Asymptotic behavior of solutions to linear differential equations with large and rapidly varying coefficients and boundary conditions. Usp. mat. nauk 15 no.4:27-95 Jl-Ag '60. (MIRA 13:9)

(Differential equations, Linear)

S/042/60/015/04/01/007
C111/C222

16

AUTHORS: Vishik, M.I., and Lyusternik, L.A.

TITLE: Asymptotic Behavior of the Solutions of Linear Differential Equations With Large or Quickly Variable Coefficients and Boundary Conditions

PERIODICAL: Uspekhi matematicheskikh nauk, 1960, Vol. 15, No. 4, pp. 27 - 95

TEXT: The authors consider boundary value problems depending on the parameter ε, where for $\varepsilon \to 0$ the coefficients of the equations or of the boundary conditions tend to ∞. In chapter I the authors investigate equations defined in the whole space, where the coefficients are finite in a subdomain Q, while in the complement $\overline{Q}$ for $\varepsilon \to 0$ they increase infinitely. In chapter II the authors consider problems in which the coefficients of the equation increase unboundedly in an infinitely thin layer T_ε around a "singular manifold Γ. In chapter III the authors investigate boundary value problems in a domain Q on the boundary Γ of which there is an oscillation (problems of the type of the Skin - effect). In all these problems the solution $u = u(x, \varepsilon)$ distinguishes by the fact that it has a singularity for $\varepsilon \to 0$. Similar

B

Card 1/2

Asymptotic Behavior of the Solutions of Linear Differential Equations With Large or Quickly Variable Coefficients and Boundary Conditions

S/042/60/015/04/01/007
C111/C222

questions were treated by the authors in (Ref. 2) and now the methods developed in (Ref. 2) are applied again. Besides the authors use arrangements of M.A. Leontovich (Ref. 4) and O.A. Oleynik (Ref. 8,9) The principal results of the paper are announced in (Ref. 3). The authors mention A.L. Gol'denveyzer.
There are 23 references : 21 Soviet and 2 American.

SUBMITTED: December 1, 1959

Card 2/2

VISHIK, M.I.; LYUSTERNIK, L.A.

Initial jump for nonlinear differential equations containing a small parameter. Dokl.AN SSSR 132 no.6:1242-1245 Je '60. (MIRA 13:6)

1. Chlen-korrespondent AN SSSR (for Lyusternik).
(Differential equations)

VISHIK, M.I.; LYUSTERNIK, L.A.

Solution of some perturbation problems in the case of matrices and self-adjoint and non-self-adjoint differential equations.
Usp.mat.nauk 15 no.3:3-80 My-Je '60. (MIRA 13:10)
(Differential equations)

86399

S/020/60/134/004/025/036XX
C111/C333

16.3500

AUTHOR: Vishik, M.I.

TITLE: On the Solubility of the First Boundary Value Problem for Nonlinear Systems of Elliptic Differential Equations

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 4, pp. 749 - 752

TEXT: Let the system

$$(1)\quad L(u)u \equiv -\sum_{i,k=1}^{n} \frac{\partial}{\partial x_i}\left(A_{ik}(x,u)\ \frac{\partial u}{\partial x_k}\right) + \sum_{i=1}^{n} B_i(x,u)\ \frac{\partial u}{\partial x_i} + C(x,u)u = h$$

where A,B,C are matrices of order N ; $u = (u_1,\ldots,u_N)$; $h = h(x) = (h_1,\ldots,h_N)$; $x \in D$; Γ is the boundary of D. Assume that the boundary condition is

$$(2)\qquad u|_{\Gamma} = 0 \ .$$

Suppositions : I. For all $w(x)$, $u(x) \in C_0^{(1)}(D)$ (space of all continuously

Card 1/5

On the Solubility of the First Boundary Value Problem for Nonlinear Systems of Elliptic Differential Equations

S/020/60/134/004/025/036XX
C111/C333

differentiable functions satisfying (2)) let

(3) $(L(w)u,u) = K(w; u,u) = \sum (A_{ik}(x,w) \frac{\partial u}{\partial x_k}, \frac{\partial u}{\partial x_i}) +$

$+ \sum \left(B_i(x,w) \frac{\partial u}{\partial x_i}, u \right) + (C(x,w)u,u) \geqslant c^2 \sum \left(\frac{\partial u}{\partial x_i}, \frac{\partial u}{\partial x_i} \right) = c^2 \|u\|^2_{1,2}$,

where $c^2 > 0$ does not depend on u,w .

II. For every matrix A_{ik}, B_i there exist invertible "majoring" matrices $\tilde{A}_{ik}$, $\tilde{B}_i$ so that

(4) $|\tilde{A}_{ik}^{-1}(x,u)| < M$, $|\tilde{B}_i^{-1}(x,u)| < M$, $|\tilde{A}_{ik}^{-1*} A_{ik}^*| < M$, $|\tilde{B}_i^{-1*} B_i^*| < M$

where $|\ |$ is the upper bound of the values of the matrix elements for all $x \in D$ and u, while * means the conjugate matrix.

III. For a certain $p = 1 + \varepsilon > 0$ $(p \leq 2)$ and all $u \in C_0^{(1)}(D)$ it is

Card 2/5

On the Solubility of the First Boundary Value Problem for Nonlinear Systems of Elliptic Differential Equations

S/020/60/134/004/025/036XX
C111/C333

(5) $\sum \left\| \tilde{A}_{ik}(x,u) \frac{\partial u}{\partial x_k} \right\|_{o,p} + \sum \left\| \tilde{B}_i(x,u) \frac{\partial u}{\partial x_i} \right\|_{o,p} + \left\| C(x,u)u \right\|_{o,p} <$

$< f(l(u))$, where f is a fixed monotone function, $l(u) = K(u; u,u)$,

$\| \ \|_{o,p} = \| \ \|_{L_p}$.

I, II can be weakened relative to the A_{ik} :

II'. The matrix $A(x,u) = \| A_{ik} \|$ (order nN) has a bounded inverse $|A^{-1}| < M$; the conditions for B_i are the same.

III'. Instead of the first summand in (5) it can be put :

$$\sum_i \left\| \sum_k A_{ik} \frac{\partial u}{\partial x_k} \right\|_{o,p} .$$

The function h(x) is said to be $\in H^{-1}(D)$, if it is representable in the

Card 3/5

On the Solubility of the First Boundary Value Problem for Nonlinear Systems of Elliptic Differential Equations

86399
S/020/60/134/004/025/036XX
C111/C333

form $h = \sum_{i=1}^{n} \frac{\partial h_i}{\partial x_i}$, where $h_i \in L_2(D)$ (Schwartz).

Theorem : If the conditions I,II,III or I,II',III' are satisfied, then for every $h(x) \in H^{(-1)}(D)$ there exists at least one generalized solution $u(x)$ of (1)-(2), where $u(x) \in W_2^{(1)}(D)$ and possesses finite norms standing on the left side in (5).
The function $u(x)$ with these finite norms and $u|_\Gamma = 0$ (in the mean) is called generalized solution of (1)-(2), if for every $v \in \overset{o}{W}{}_q^{(1)}(D)$, where $q = \frac{p}{p-1}$, $v|_\Gamma = 0$, it holds

(6) $K(u;u,v) = (h,v) = -\sum (h_i, \frac{\partial v}{\partial x_i})$ $\quad (h = \sum \frac{\partial h_i}{\partial x_i})$.

Card 4/5

On the Solubility of the First Boundary Value Problem for Nonlinear Systems of Elliptic Differential Equations

86399
S/020/60/134/004/025/036XX
C111/C333

2 examples are given (1. an equation (1) with $B_i \equiv C \equiv 0$; 2. a nonlinear equation of fourth order).
Theorem 1 can be generalized to systems of the order 2m and to corresponding operator equations.
The author mentions S.L. Sobolev and Galerkin.
There are 2 Soviet references.

ASSOCIATION: Moskovskiy energeticheskiy institut (Moscow Power Engineering Institute)

PRESENTED: May 23, 1960, by S.L. Sobolev, Academician

SUBMITTED: May 18, 1960

Card 5/5

L 23863-65 EWT(d) [illegible]

[illegible]

SOURCE: Ref. zh. Matematika. Abs. 5R115

AUTHOR: Vishik, M. I.

[illegible]

CITED SOURCE: Materialy* k Soymestnomu sovetsko-amerikanskomu simpoziu

TOPIC TAGS: boundary value problem, quasilinear equation, elliptical equation

TRANSLATION: The basic content of the paper deals with the study of the first

Card 1/ 4

ACCESSION NR: AR4046310

Card 2/4

$\rho(\xi)$ is an arbitrarily fast growing convex function

where $A_{ab} = \frac{\partial A_a}{\partial \xi_b}$

(5a)

The [illegible] of the symmetrical part

$\Phi(\eta)$ is [illegible] $\rho(\xi)$ according to Young.

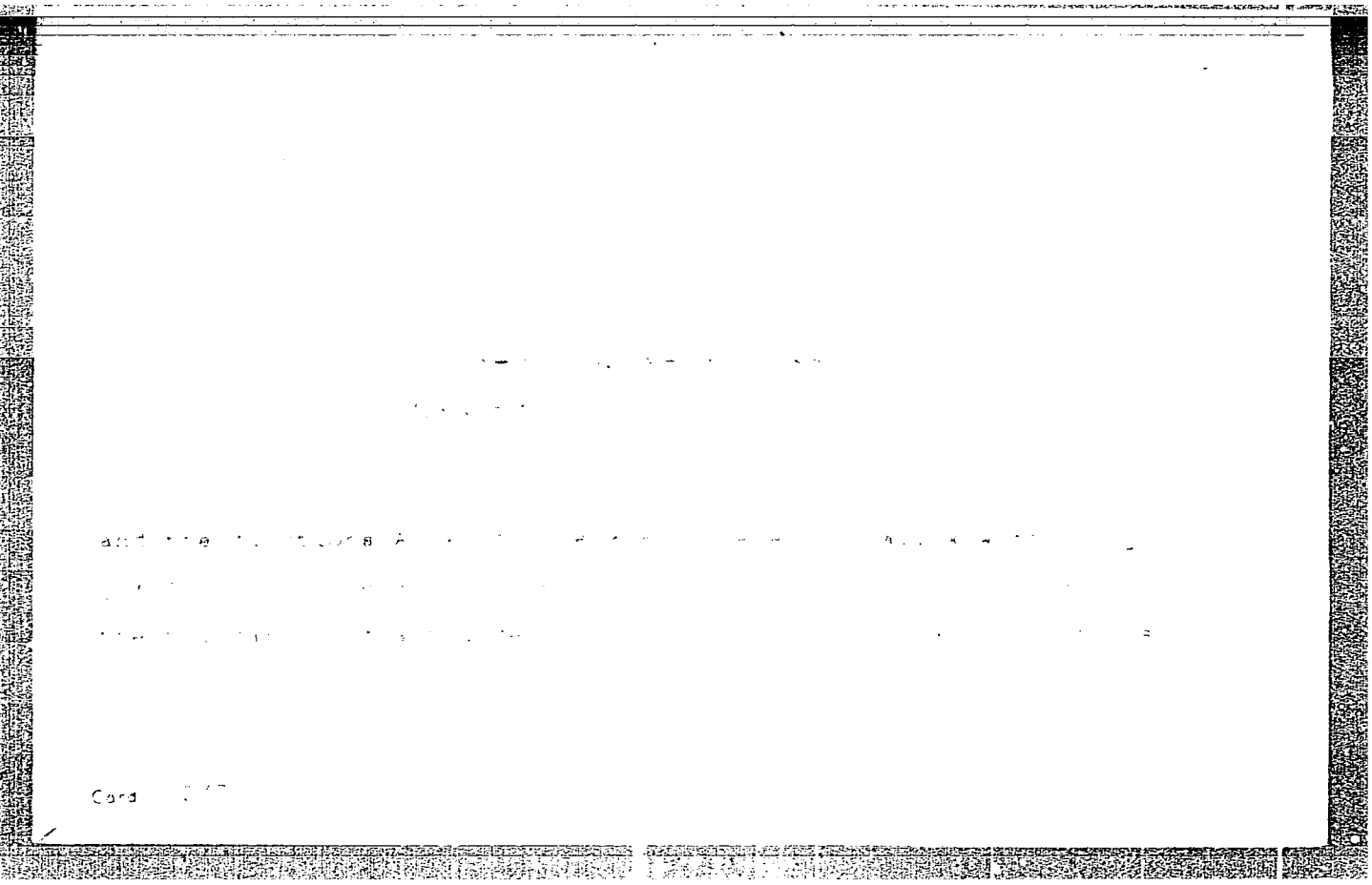
Card 3/4

lated to a number of works by the same author, particularly to the paper (RZHMat., 1963, 12B310). Yu. Dubinskiy

SUB CODE MA

SOURCE: Ref zh. Matematika, Abs. 7B166

AUTHOR: Vishik, M. I.



where $A_{ss}\frac{\partial A_s}{\partial \varepsilon_p}$ and $\varphi(\zeta) > 0$ when $\zeta > 0$. Degeneration is, however

(3)

permitted for $r = 0$, i.e., it is possible for

ACCESSION NR: AR4043408

Section 4 deals with quasilinear strongly elliptic equations

Card 4/7

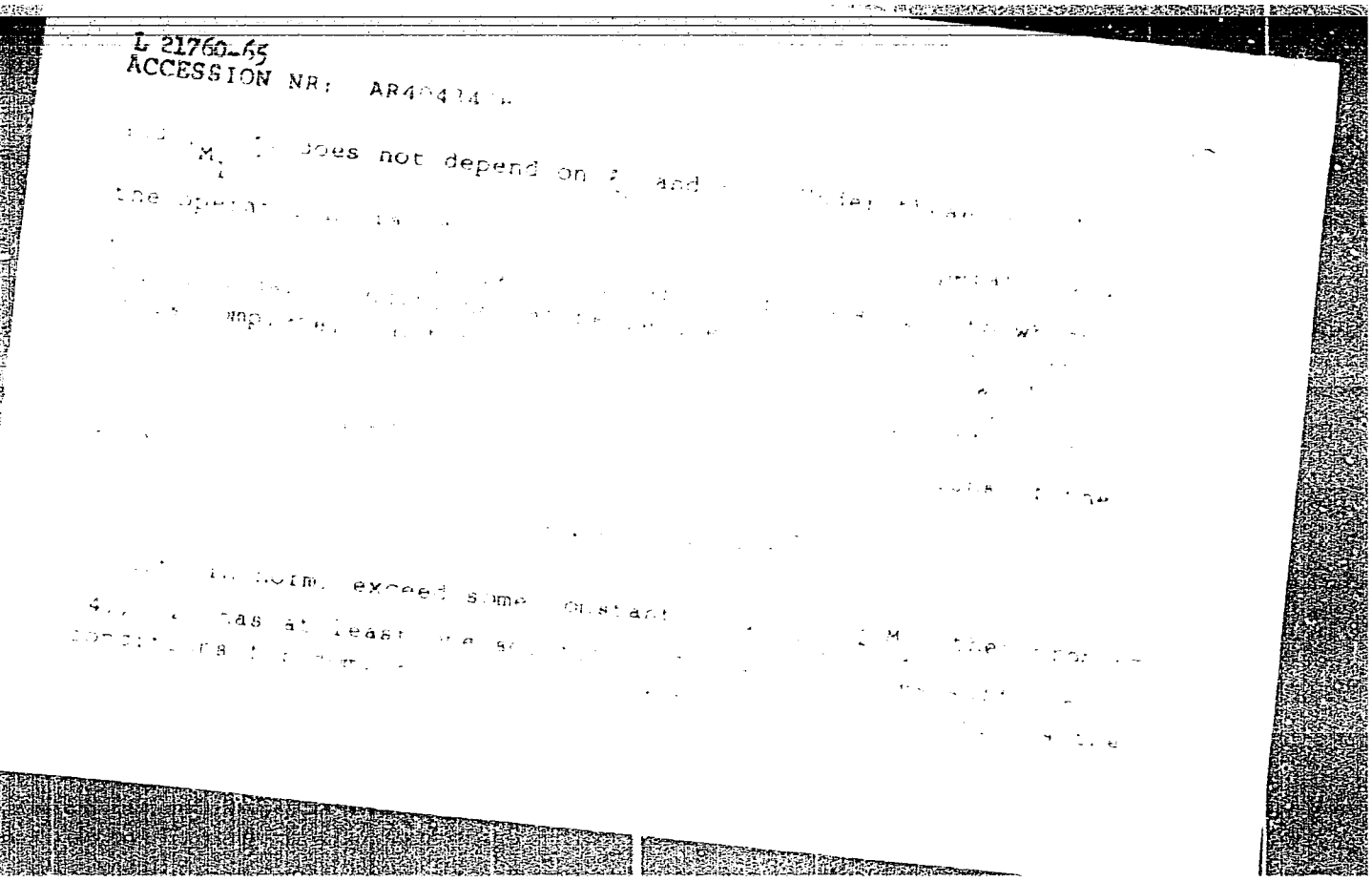
L 21750-65
ACCESSION NR: AR4043408

$$1+\sum_{0<|\beta|<\infty}(-1)^{|\beta|}D^{\beta}V_{\beta}(x,D^{\alpha},D^{\beta}u)=0,$$

where

of

damenta

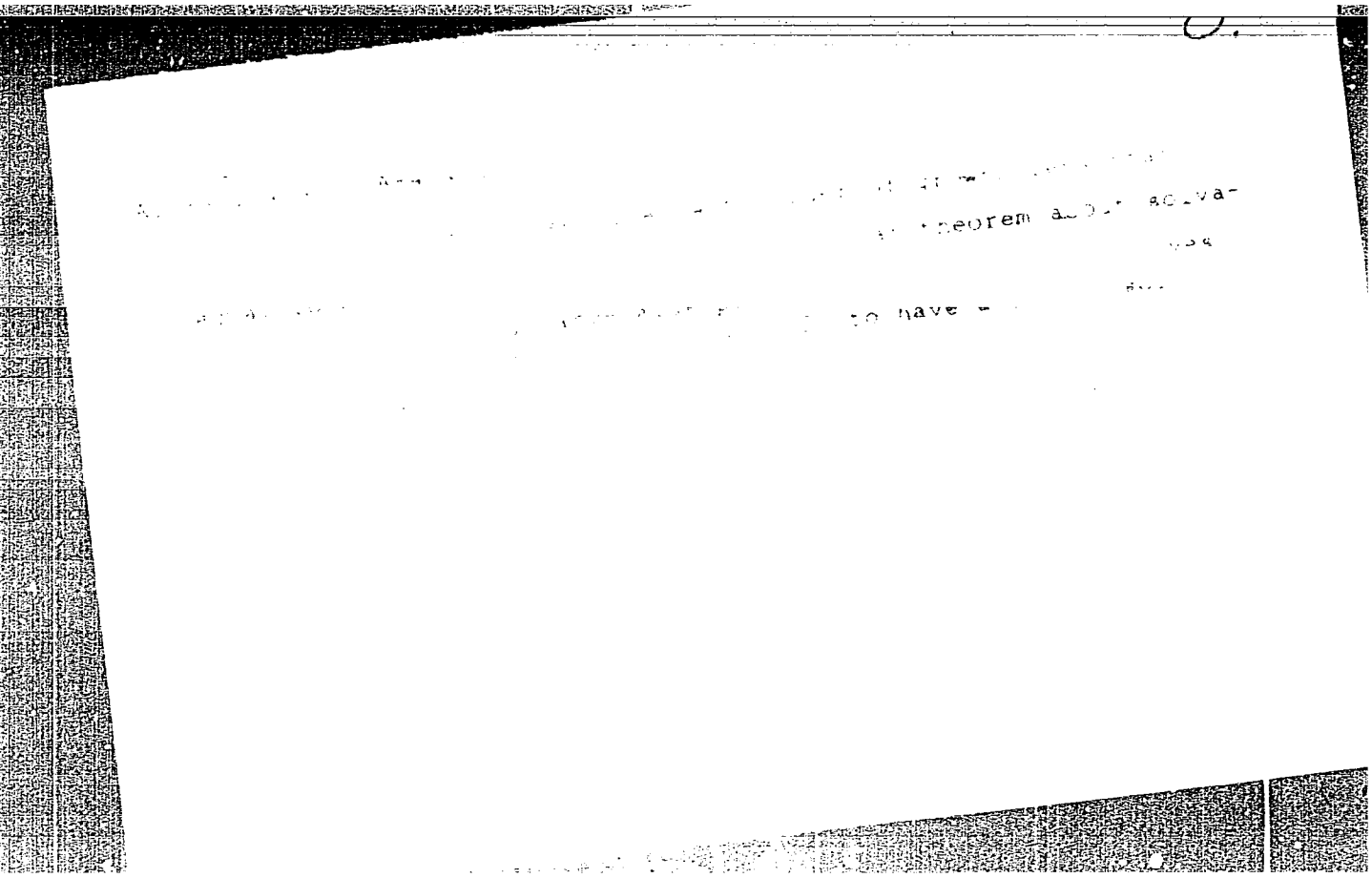


L 21760-65
ACCESSION NR: AR4044[illegible]

M[illegible] does not depend on [illegible] and

[illegible] exceed some constant

[illegible] has at least [illegible]



VISHIK, S.M.; KOBRINSKIY, A.A.; ROZENTAL', A.L. (Moscow)

Dividing partitions for a finite system of measures. Teor. veroiat. i ee prim. 9 no.1:165-167 '64. (MIRA 17:4)

VISHIK, S.M.; ROZENTAL', A.L.

Divisions of exponential families of distribution. Vest. Mosk. un. Ser.1: Mat., mekh. 18 no.5:47-49 S-O '63. (MIRA 16:10)

1. Moskovskiy gosudarstvennyy universitet, kafedra teorii veroyatnostey.

ACC NR: AM6026118 Monograph UR/

Vishin, Gennadiy Mikhaylovich

Identification of moving targets (Selektsiya dvizhushchikhsya tseley) Moscow, Voyenizdat M-va obor. SSSR, 1966. 274 p. illus., biblio. 7,000 copies printed.

TOPIC TAGS: defense radar, ground radar, radar detection, surveillance radar, radar reconnaissance, radar signal analysis, radar signal processing, radar tracking, radar target tracking, aerial target, target discrimination

PURPOSE AND COVERAGE: The author discusses the principles of operation of ground radar installations used in detecting and identifying moving targets. The problem involves the separation and elimination of interferences by variety of objects, such as ground structures, vegetation, clouds, precipitation, dummies, etc., and their separation from useful signals. The text is based on a survey of the various methods devised both in the Soviet Union and in other countries to cope with these problems, i.e., methods for identifying moving targets, methods for suppressing interferences, including the compensation method of eliminating disturbing reflections, as well as the design of coherent-pulse systems and the characteristics of their receivers. The book is intended for specialists concerned

Card 1/3 UDC: 621.396.963.391

with radar detection of moving targets as well as the general reader interested in this subject. There are 32 Soviet references cited, some of which are Soviet translations of Western literature.

TABLE OF CONTENTS

Introduction -- 3

Ch. I. Methods of identifying moving targets -- 5
1. Analysis of disturbing reflections -- 6
2. Methods of identifying signals from moving targets -- 19
Ch. II. Coherent-pulse system for identifying moving targets -- 40
1. Analysis of spectra of reflected signals -- 40
2. Coherent-pulse systems with a small duty-factor -- 45
3. Coherent-pulse systems with external coherence -- 53
4. Coherent-pulse systems with internal coherence -- 56
Ch. III. Methods for suppressing disturbing reflections -- 71
1. Spectral methods for suppressing disturbing reflection -- 71
2. Compensation method for suppressing disturbing reflections -- 82
Ch. IV. Design characteristics of coherent-pulse systems -- 152
1. Receiver sensitivity of coherent-pulse radar stations -- 152
2. Fluctuations in disturbing reflections and methods of eliminating their effect -- 152

ACC NR: AP6036100 SOURCE CODE: UR/0256/66/000/011/0057/0060

AUTHOR: Vishin, C. M. (Engineer; Major)

ORG: none

TITLE: New method of organizing repair

SOURCE: Vestnik protivovozdushnoy oborony, no. 11, 1966, 57-60

TOPIC TAGS: ~~operations research~~, industrial ~~organization~~ management, industrial production

ABSTRACT: In this article it is stated that to develop a work-flow diagram for repair work it is necessary to obtain the following information and technical documentation: technical diagrams of the object being repaired; time required for the job; the number of workers required on each shift; data on industrial production of spare parts, tools, and accessories; delivery deadline for spare parts, tools, and accessories; responsibility for completing the work must be assigned. It is also stated that this method can be used in repair workshops to accomplish extensive repairs, where several sections and subdivisions take part in the work. Orig. art. has: 2 figures. [WS]

SUB CODE: 05, 12, 15/ SUBM DATE: none

Card 1/1 UDC: none

L 12403-63 EWT(d)/FCC(w)/BDS AFFTC/APGC IJP(C)

ACCESSION NR: AP3001386 S/0020/63/150/004/0719/0721

AUTHOR: Vishin, V. V. 52

TITLE: Identical transformations in four-valued logic 16

SOURCE: AN SSSR. Doklady, v. 150, no. 4, 1963, 719-721

TOPIC TAGS: identical transformations, K-valued logic, complete identity system, closed class of function, finite base

ABSTRACT: The problem of identical transformations of K-valued logic is reduced to finding complete identity systems for closed classes of functions which have a finite base. To find the minimum value for K for closed classes of functions which do not have a finite complete system of identities, the present work shows an example of such a four-valued closed class logic and proves it by using four lemmas. The complete solution of the problem requires the consideration of only case where K = 3. Orig. art. has 1 table.

ASSOCIATION: none

SUBMITTED: 14Dec62 DATE ACQ: 01Jul63 ENCL: 00

SUB CODE: 00 NO REF SOV: 002 OTHER: 000

Card 1/1

L 12403-63 EWT(d)/FCC(w)/BDS AFFTC/APGC IJP(C)

ACCESSION NR: AP3001386 S/0020/63/150/004/0719/0721

AUTHOR: Vishin, V. V. 52

TITLE: Identical transformations in four-valued logic 16

SOURCE: AN SSSR. Doklady, v. 150, no. 4, 1963, 719-721

TOPIC TAGS: identical transformations, K-valued logic, complete identity system, closed class of function, finite base

ABSTRACT: The problem of identical transformations of K-valued logic is reduced to finding complete identity systems for closed classes of functions which have a finite base. To find the minimum value for K for closed classes of functions which do not have a finite complete system of identities, the present work shows an example of such a four-valued closed class logic and proves it by using four lemmas. The complete solution of the problem requires the consideration of only case where K = 3. Orig. art. has 1 table.

ASSOCIATION: none

SUBMITTED: 14Dec62	DATE ACQ: 01Jul63	ENCL: 00
SUB CODE: 00	NO REF SOV: 002	OTHER: 000

Card 1/1

VISHIN, V.V.

Identical transformations in four-digit logic. Dokl. AN SSSR 150 no.4:719-721 Je '63. (MIRA 16:6)

1. Predstavleno akademikom P.S. Novikovym.
(Logic, Symbolic and mathematical)

MUSHKETYANU, K.; MUSHKETYANU, V.; V[illegible], S.

Role of nuclear monocyte fragmentation in the diagnosis of atypical forms of infectious mononucleosis. Probl. gemat. i perel. krovi no.2:35-36 '65. (MIRA 18:11)

1. Laboratoriya eksperimental'noy sed tolny bol'nitsy imeni Koltsya, Bukharest, Rumyniya.

VISHINSKIY, Aleksandr Mikhaylovich

[Fertilizers and their use] Dobryva ta ikh vykorystannia. Vyd.2. Kyiv, Derzh.vyd-vo sil'skohospodarskoi lit-ry URSR, 1959. 324 p. (MIRA 13:9)
(Fertilizers and manures)

YUKHIMCHUK, F.P.[IUkhymchuk,F.P.], otv. red.; VISHINSKIY, O.M. [Vyshyns'kyi, O.M.], red.; GOLOMBA, R.A.[Holomba, R.A.] red.; DMITRENKO, P.O.[Dmytrenko, P.O.], doktor sel'khoz. nauk, red.; IL'YASHENKO, M.G.[Illiashenko, M.H.], red.; KOLOBOV, O.M., red.; KUKSIN, M.V., red.; LAZURSKIY, O.V. [Lazurs'kyi, O.V.], kand. sel'khoz. nauk, red.; POPOV, F.A., red.; SAMBUR, G.M.[Sambur, H.M.], red.; SAMTSEVICH, S.A.[Samtsevych, S.A.], red.; FEDOROVA, N.A.,kand.sel'khoz nauk. red.; YASHOVSKIY, I.V.[IAshovs'kyi, I.V.], red.

[Nutrition and fertilizers of farm crops] Zhyvlennia ta udobrennia sil's'kohospodars'kykh kul'tur. Kiev, Urozhai, 1964. 137 p. (MIRA 17:10)

1. Ukrains'kyy naukovo-doslidnyy instytut zemlerobstva.

VISHINSKIY, O.M.[Vyshyns'kyi, O.M.], kand.sel'skokhoz.nauk;
GANDZIY, P.P.[Handzii, P.P.], starshiy nauchnyy sotrudnik

Methods of applying organic and mineral fertilizers to potatoes in the Ukrainian Polesye. Nauch. trudy UASHN 9:77-85 '59.
(MIRA 14:3)

(Polesye—Potatoes—Fertilizers and manures)

YUKHIMCHUK, F.P.[IUkhymchuk, F.P.], otv. red.; VISHINSKIY, O.M. [Vyshyns'kyi, O.M.], red.; GOLOMBA, R.A.[Holomba, R.A.], red.; DMITRENKO, P.O.[Dmytrenko, P.O.], red.; IL'YASHENKO, M.G.[Illiashenko, M.H.], red.; KOLOBOV, O.M., red.; KUKSIN, M.V., red.; LAZURSKIY, O.V.[Lazurs'kyi, O.V.], red.; POPOV, F.A., red.; SAMBUR, G.M.[Sambur, H.M.], red.; SAMTSEVICH, S.A.[Samtsevych, S.A.], red.; FEDOROVA, N.A., red.; KATRENKO, K.A., red.

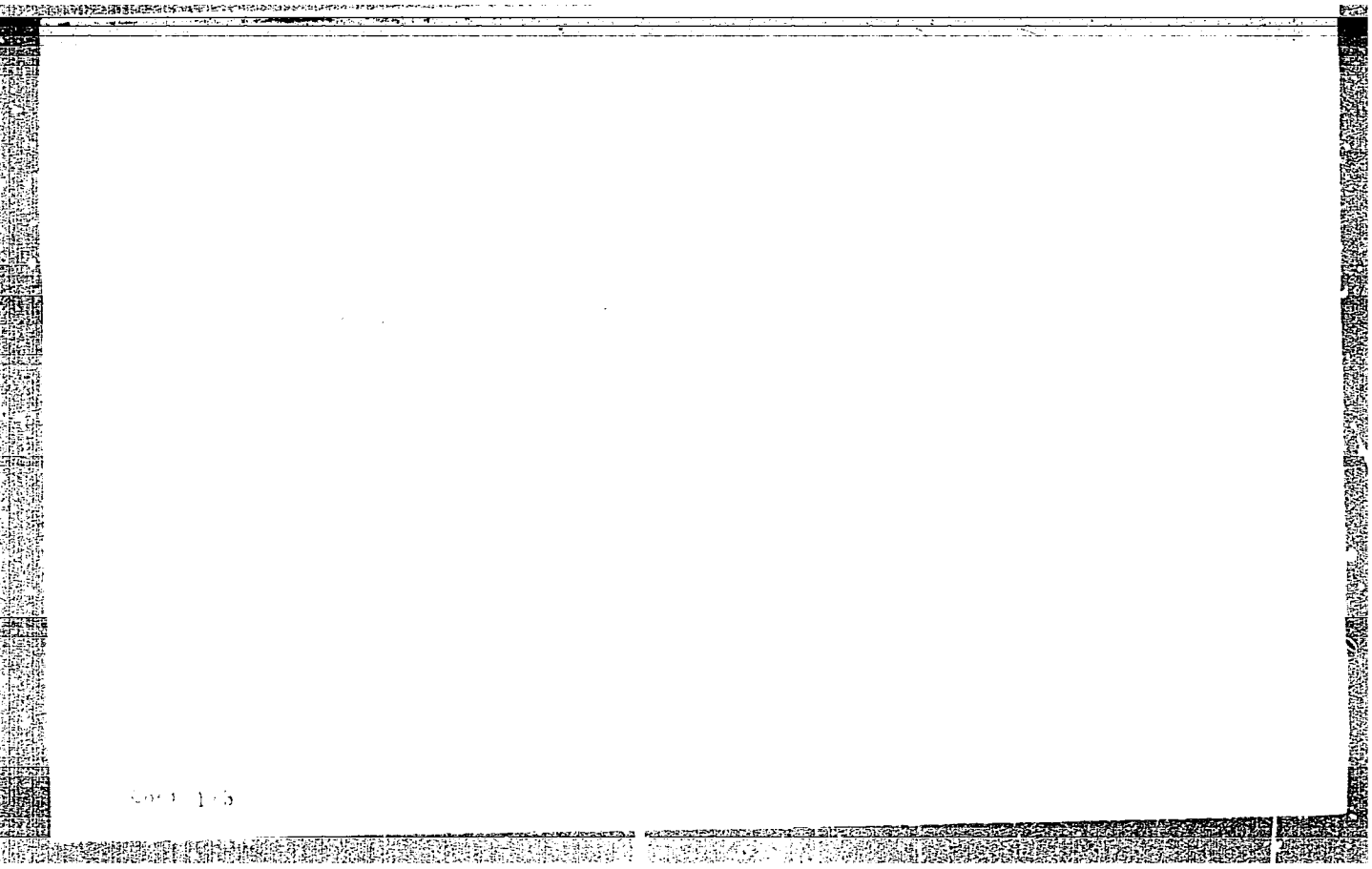
[Fertilizers and cultivation practices] Dobryva ta agrotekhnika. Kyiv, Urozhai, 1964. 160 p. (MIRA 17:12)

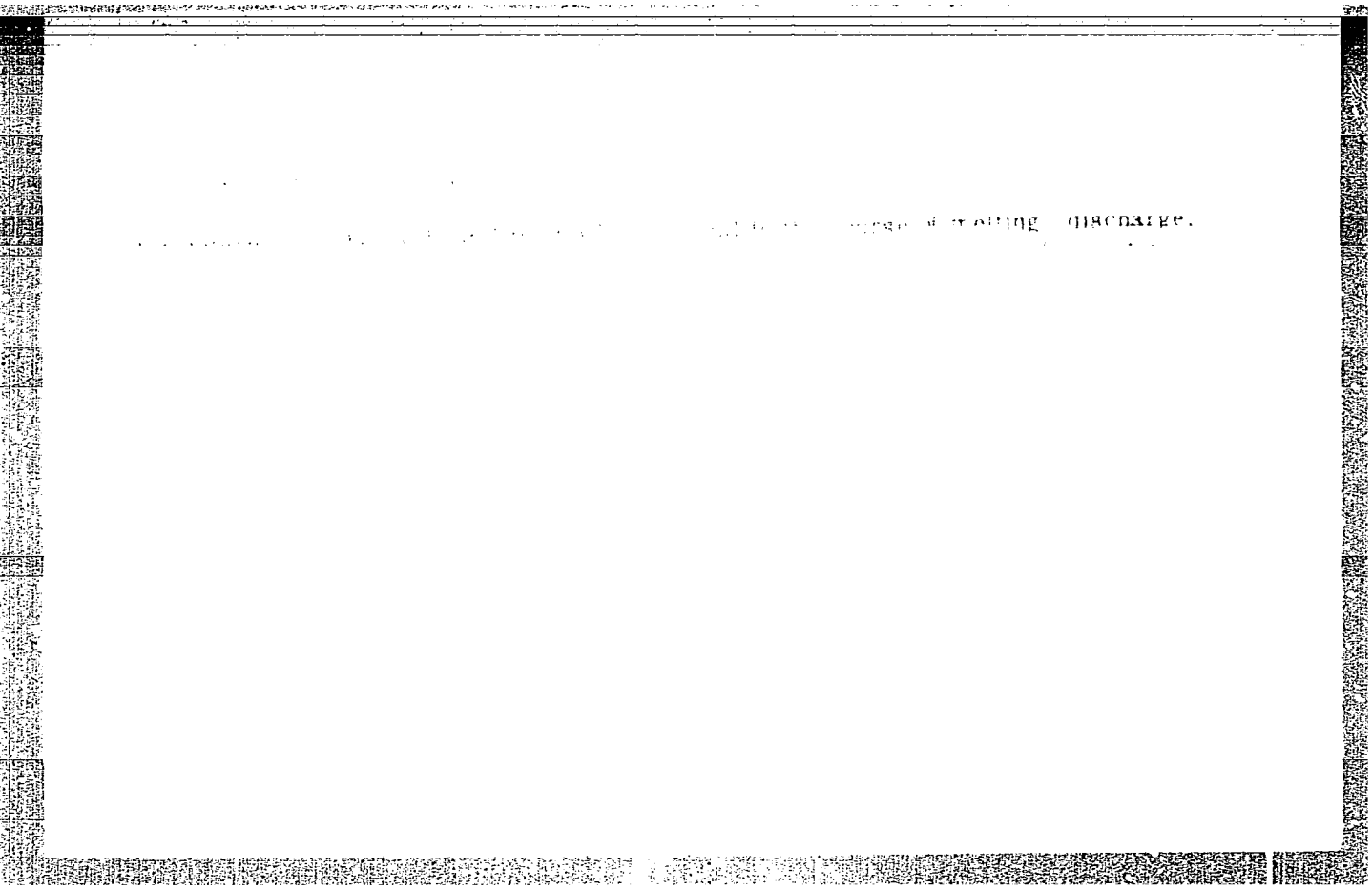
1. Kiev. Ukrains'kyi naukovo-doslidnyi instytut zemlerobstva.

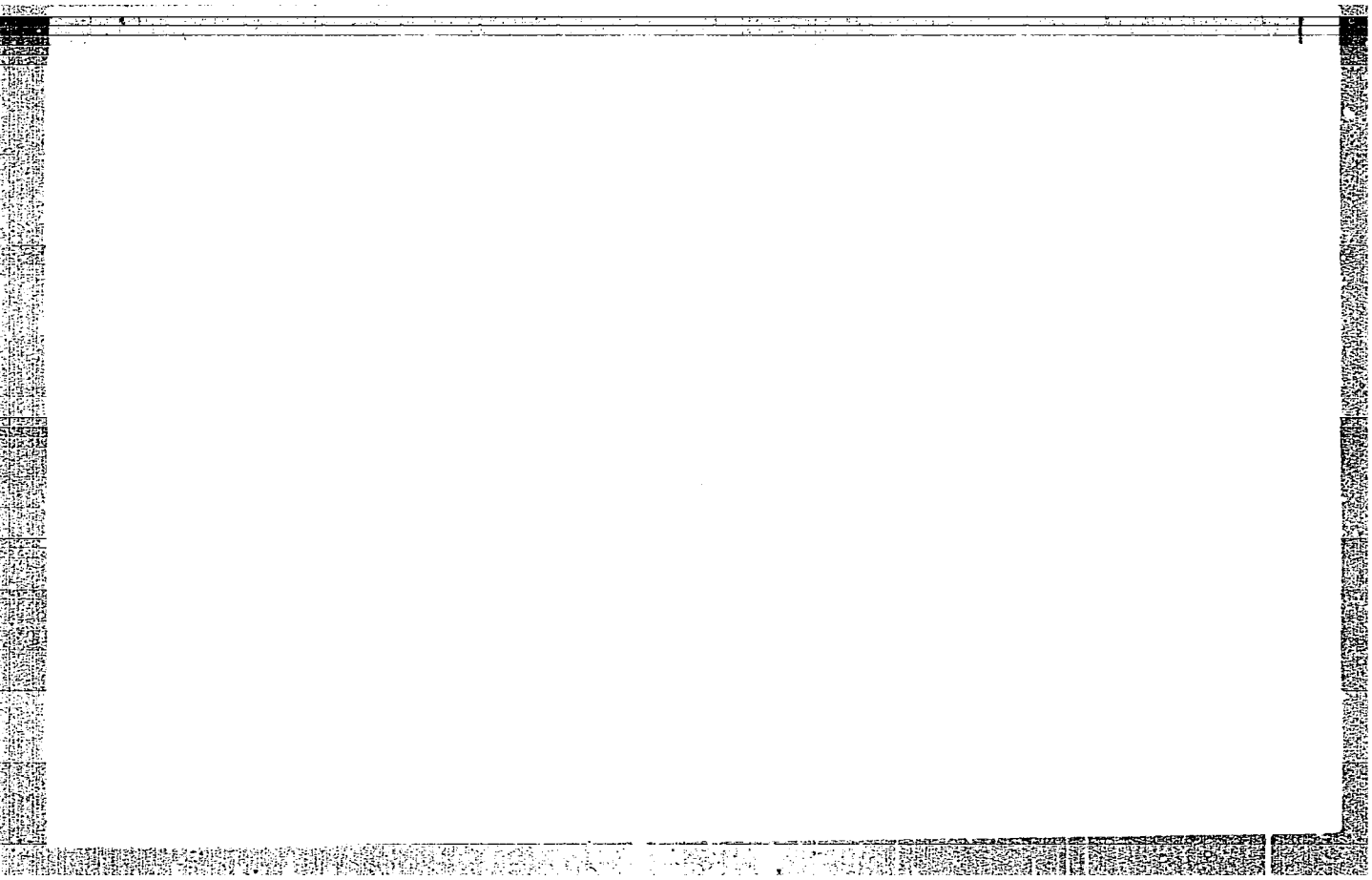
DRAGOMIR, I.; VISHKAREV, A.F.; YAVOYSKIY, V.I.

Investigating the properties of iron-phosphorus melts. Izv. vys. ucheb. zav.; chern. met. 7 no.11:50-52 '64. (MIRA 17:12)

1. Moskovskiy institut stali i splavov.







APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001860030001-2"

MOKHAMED FIKRI ABDEL'RAZIK MIKKAUI; VISHKAREV, A.F.; YAVOYSKIY, V.I.

Nature of the brown smoke formed during the oxygen blowing of the metal. Izv. vys. ucheb. zav.; chern. met. 6 no.11:37-41 '63.
(MIRA 17:3)

1. Moskovskiy institut stali i splavov.

DRAGOMIR, I.; VISHKAREV, A.F.; YAVOYSKIY, V.I.

Investigating the properties of iron-phosphorus melts. Izv. vys. ucheb. zav.; chern. met. 7 no.7:48-52 '64
(MIRA 17:8)

1. Moskovskiy institut stali i splavov.

BLIZNYUKOV, S.A.; VISHKAREV, A.F.; VAVOYSKIY, V.I.

Equipment for determining the surface tension of liquid metals.
Izv. vys. ucheb. zav.: chern. met. 7 no.7:227-232 '64
(MIRA 17:8)

1. Moskovskiy institut stali i splavov.

LUZGIN, V.P.; VISHKAREV, A.F., kand.tekhn.nauk; YAVOYSKIY, V.I., doktor tekhn.nauk

Method for the automatic measurement of carbon content in liquid steel. Avtom.i prib. no.3:18-20 Jl-S '62. (MIRA 16:2)

1. Moskovskiy institut stali.
(Steel—Analysis)

BANNIK, B.P.; VISHKI, T.; DO IN SEB;

[A criterion of the separation of p-p interactions in nuclear emulsions] Ob odnom iz kriteriev otbora p-p - vzaimodeistvii v iadernykh emul'siiakh. Dubna, Ob"edinennyi in-t iadernykh issl., 1963. 5 p. (MIRA 17:7)

AZIMOV, S.A.; BANNIK, B.P.; VISHKI, T.; GULYAMOV, U.G.; DO IN SEB; RAKHIMBAYEV, B.G.; CHERNOVA, L.I.

Inelastic pp-interactions with low transfer of momentum. IAd. fiz. 1 no.4:676-680 Ap '65. (MIRA 18:5)

1. Ob'yedinennyy institut yadernykh issledovaniy. 2. Sotrudniki Instituta yadernoy fiziki AN Uzbekskoy SSR (for Azimov, Gulyamov, Rakhimbayev, Chernova).

BANNIK, B.P.; VISHKI, T.; DO IN SEB

One of the selection criteria of pp-interactions in nuclear emulsions. Prib. i tekh. eksp. 9 no.5:70-72 S-O '64.
(MIRA 17:12)

1. Ob"yedinennyy institut yadernykh issledovaniy.

L 23737-66 EWT(m)/T
ACC NR: AP6014820 SOURCE CODE: UR/0367/65/001/004/0676/0680

AUTHOR: Azimov, S. A.; Bannik, B. P.; Vishki, T.; Seb, Do In; Gulyamov, U. G.; Rakhimbayev, B. G.; Chernova, L. I.

ORG: [Azimov, Gulyamov, Rakhimbayev, Chernova] Institute of Nuclear Physics, AN UzbSSR (Institut yadernoy fiziki AN UzbSSR); Joint Institute of Nuclear Research (Ob"yedinennyy institut yadernykh issledovaniy)

TITLE: Inelastic pp-interactions with low momentum transfer
SOURCE: Yadernaya fizika, v. 1, no. 4, 1965, 676-680
TOPIC TAGS: inelastic interaction, nuclear emulsion, proton, isobar

ABSTRACT: The nuclear emulsion method is used to study inelastic pp--interactions for energies of 2.26 and 9 GEV of a primary proton. The search for events in the emulsion was performed by accelerated inspection of traces. Energy distributions were obtained for slow protons. The events selected are of two types: pp-interactions and a small number of interactions connected with secondary processes in the nucleus. For the energy distribution all cases were taken with their weights K = 1/W, where W is the probability of registration. Both distributions were normalized for the complete observed path of primary protons R = 3694m. In the processing of the experimental data the relative output of the reaction was evaluated qualitatively with the formation of one or two isobars. The authors thank Van Shu-fen', T. Vishki, I. M. Gramenitskiy, V. G. Grishin, N. Dalkhazbav, R. M., Lebedev, A. A. Nomofilov, M. I. Podgoretskiy,

Card 1/2

L 23737-66
ACC NR: AP6014820

9

V. N. Strel'tsov for providing us the materials, which were so useful in this work. The authors also thank I. M. Gramenitskiy for his interest and assistance in the work; M. I. Podgoretskiy for the discussions; and E. G. Bubelev, A. Yuldashev, V. N. Strel'tsov, Yu. A. Troyan and V. G. Grishin for participating in the discussions and for their remarks. The authors offer further thanks to the laboratory workers of IYaF, AN UzbSSR and LVE OIYaI for carrying-out the review of photoemulsions and measurements; and A. T. Balandikov for help in carrying-out the calculations. Orig. art. has: 4 figures. [JPRS]

SUB CODE: 20 / SUBM DATE: 01Jul64 / ORIG REF: 006 / OTH REF: 001

Card 2/2 UDC

PERMYAKOV, L.N. (Moskva); KRYAKOVSKIY, Yu.V. (Moskva); VISHKAREV, A.F. (Moskva); YAVOYSKIY, V.I. (Moskva)

Effect of rare-earth metals on the behavior of nitrogen in liquid iron and steel. Izv. AN SSSR. Met. i gor. delo no.4:68-75 Jl-Ag '64. (MIRA 17:9)

S/148/61/000/011/002/018
E071/E180

AUTHORS: Kozlov, V.I., Vishkarev, A.F., Zil'berman, A.G., and Yavoyskiy, V.I.

TITLE: Diffusion of carbon and oxygen in liquid steel

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Chernaya metallurgiya, no.11, 1961, 38-44

TEXT: In order to establish the relative rates of diffusion of carbon and oxygen in liquid steel (which are important in explaining the mechanism of oxidation of carbon) the authors made an attempt to measure the diffusion coefficients of these two elements in molten iron. The diffusion coefficient of carbon was determined using C^{14} by the method of orthoradiography. Since capillaries of 5-6 mm in diameter were used the influence of convection was not eliminated and out of numerous experiments only 11 results could be used for the determination of the coefficient. This was found to be equal to 4×10^{-5}-1.92×10^{-4} cm^2/sec, which is close to published data. The diffusion coefficient for oxygen was determined by the method of semi-

Card 1/ 2

infinite rod with a constant source of oxygen (blowing of oxygen on the surface of iron for one minute at a rate of 0.5 %/min). It was found that the diffusion coefficient for oxygen is higher than that of carbon by about two orders, namely (3.0 - 7.8) x 10^{-3} cm^2/sec. The results invalidated the generally held view that the diffusion of oxygen is slower than carbon. Bearing in mind possible experimental inaccuracies, it can be stated that the diffusion of carbon in molten iron is not faster than that of oxygen. S.Z. Bokshteyn, I.S. Kulikov and A.A. Zhukhovitskiy are mentioned in the article.
There are 4 figures, 2 tables and 12 references: 9 Soviet-bloc and 3 non-Soviet-bloc. The English language reference reads:
Ref.4: D.W. Morgan, J.A. Kitchener. Transactions of the Faraday Society, v.50, no.1, 1954.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: June 24, 1961

VISHKAREV, A. F.

PHASE I BOOK EXPLOITATION SOV/5411

Konferentsiya po fiziko-khimicheskim osnovam proizvodstva stali. 5th, Moscow, 1959.

Fiziko-khimicheskiye osnovy proizvodstva stali; trudy konferentsii (Physicochemical Bases of Steel Making; Transactions of the Fifth Conference on the Physicochemical Bases of Steelmaking) Moscow, Metallurgizdat, 1961. 512 p. Errata slip inserted. 3,700 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A. A. Baykova.

Responsible Ed.: A. M. Samarin, Corresponding Member, Academy of Sciences USSR; Ed. of Publishing House: Ya. D. Rozentsveyg. Tech. Ed.: V. V. Mikhaylova.

Card 1/16

Physicochemical Bases of (Cont.) SOV/5411

PURPOSE: This collection of articles is intended for engineers and technicians of metallurgical and machine-building plants, senior students of schools of higher education, staff members of design bureaus and planning institutes, and scientific research workers.

COVERAGE: The collection contains reports presented at the fifth annual convention devoted to the review of the physicochemical bases of the steelmaking process. These reports deal with problems of the mechanism and kinetics of reactions taking place in the molten metal in steelmaking furnaces. The following are also discussed: problems involved in the production of alloyed steel, the structure of the ingot, the mechanism of solidification, and the converter steelmaking process. The articles contain conclusions drawn from the results of experimental studies, and are accompanied by references of which most are Soviet.

Bogatenkov, V.F., K.T. Kurochkin, and P.V. Umrikhin. Investigating the Permeability of Basic Open-Hearth Slag to Hydrogen 195

Grigor'yev, V.P., A.F. Vishkarev, B.G. Korolev, Ye.V. Abrosimov, and V.I. Yavoyskiy. Effect of Phosphorus and Manganese on the Surface Tension of Ferrocarbon Alloys 204

Khitrik, S.I., and Ye.I. Kadinov. Reducing Chromium Losses in Making Stainless Steel With the Use of Oxygen [Blast] 213
[The following persons participated in the research work: A.V. Rabinovich, Yu.V. Chepelenko, V.P. Frantsov, I.P. Zabaluyev, V.F. Smolyakov, P.V. Demidov, M.M. Dovgiy, T.M. Bobkov, Ye.I. Moshkevich, A.M. Neygovzen, T.F. Olenich, K.P. Gunaza, B.I. Zlatkina, and Yu.A. Nefedov.]

PART II. CONVERTER PROCESSES

Baptizmanskiy, V.I. Certain Problems of the Mechanism and

S/148/60/000/007/017/023/XX
A161/A033

AUTHORS: Yavoyskiy, V. I.; Vishkarev, A.F.

TITLE: Oxidation of molten metal additions in steel making processes. Part II. Oxidation of Silicon and Phosphorus.

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no. 7, 1960, 24 - 31

TEXT: In part I it was shown that the relative oxidation rate of various elements in a steel bath which is blown through with oxidizing gas depends to a considerable degree on their surface activity in the metal-gas boundary zone. The discussions concern the oxidation sequence of silicon and phosphorus. The system Fe-C-Si is analyzed using data of D. Hilty and B. Krafts (Ref. 1: J. of Metals, 1950, No. 2), Vecher, Hamilton, Dastur, Chipman, J. F. Elliot (Ref. 2: The Carbon Oxygen Equilibrium on Liquid Iron, The physic. chem. of St. mak., Massachusetts,1956), Gibbs and the Shishkovskiy and Langmuir equations. Joint oxidation of phosphorus and carbon, and the effect of manganese is discussed with references to previous Soviet works (Ref. 5: Yavoyskiy, V. I.; Vishkarev, A.F. Izvestiya vysshikh uchebnykh zavedeniy, Chernaya metallurgiya, 1960, No.5; Ref. 6: Grigor'yev, V. P., Korolev, B.G. et al. Izvestiya vysshikh uchebnykh

Card 1/4

Oxidation of molten metal ....

zavedeniy, Chernaya metallurgiya, 1960, no. 4). As the adsorption calculations become very cumbersome for a four-component system (Fe-C-P-Mn), the calculation is carried out for a three-component system only. It is mentioned that cases are not rare when C and P oxidize simultaneously, and even S burns. The basic cause of this is supposed to be the uneven contact of metal with the oxidizing gas, for it is practically impossible to achieve a perfectly uniform air distribution in metal even by blowing through the bottom. Investigation in models revealed air jets and separate bubbles which were comparatively large. Uniform mixing of oxidizing gas with metal is even less probable in converters with the blast from the top, in open-hearth furnaces, or in rotary furnaces. Though, M. M. Karnaukhov and S. K. Chuchmarev used radioactive indicators and proved that the distribution of impurities in a boiling (or generally turbulent) bath may be described by equations similar to the molecular diffusion equations (replacing the molecular diffusion factors with "effective" or "virtual" diffusion rate factors). The available data on the rate of molecular diffusion of impurities in molten iron are scarce, and it appears that the data of A. M. Samarin and L. A. Shvartsman (Ref. 8: Izv. AN SSSR, OTN, 1947, No. 12) and Paschke and Hautman (Ref. 9: Archiv f.d. Eisenhuettenwesen, 1953, S. 305) are the most

accurate. In general, the available data are yet too insufficient for evaluating the relative adsorption rate of various elements, or for comparison with the diffusion rate. All discussions in this work cannot yet be practically applied for the determination of the oxidation of the elements on the metal-slag boundary, for the effect of separate slag components and of the metal bath in particular on the interphase tension in the interfacial zone has scarcely been studied, and the known Antonov rule does not always seem to be applicable. Conclusions: 1) In the case of usual Bessemer iron compositions, the Si concentration is considerably higher on the surface than in the volume, and the C concentration is nearly equal on the surface and in the volume. Due to this, Si can oxidize in perfect mixing conditions to a very low content before the start of C oxidation. Thermodynamic calculations based on volume concentration cannot explain such deep Si oxidization. 2) The intense oxidization of P in Fe-C-P systems in the presence of sufficiently basic slags can be explained by the surface activeness of P. 3) The simultaneous oxidization of several elements and the lack of regularity in the sequence of their oxidization and in the thermodynamics of the surface reactions is due to nonuniform distribution of oxidizing gas in metal and the presence of zones with perfect and imperfect mixing. 4) The subsurface layers lose their impurities through adsorp-

Oxidation of molten metal ....

tion in the surface, and new quantities of impurities form by diffusion from deeper layers. It can be assumed (in the first approximation) that the effective diffusion rate of the metal bath components is nearly proportional to the molecular diffusion rate factors, particularly at perfect mixing of oxidizing gas with metal. Due to this the oxidization of Si and Mn can be faster in perfect mixing comparing with the oxidization of C or S (for the diffusion rate factors of Si and Mn are higher). 5) The speed of the components adsorption from the molten bath (i.e., the atoms or ions transfer from the volume to the surface) seems also to affect the metal refining in certain conditions. However, no experiment data are yet available for evaluation of this effect. There are 9 references: 6 Soviet-bloc and 3 non-Soviet-bloc. The references to English language publication read as follows: D. Hilty, B. Krafts, J. of Metals, 1950, No. 2; J. F. Elliot, The Carbon Oxygen Equilibrium on Liquid Iron. The physic. chem. of St. mak. Massachusetts, 1956.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: 22 December 1959

Card 4/4

YAKUSHEV, A.M.; YAVOYSKIY, V.I.; KRYAKOVSKIY, Yu.V.; Prinimali uchastiye: TYURIN, Ye.I., kand.tekhn.nauk; KRAUZE, I.E., kand.tekhn.nauk; VISHKAREV, A.F., kand.tekhn.nauk

Effect of rare earth elements on hydrogen solubility in liquid iron. Izv. vys. ucheb. zav.; chern. met. 4 no.7:44-54 '61. (MIRA 14:8)

1. Moskovskiy institut stali.
(Iron—Hydrogen content)
(Rare earth metals)

LUZGIN, V.P.; VISHKAREV, A.F.; YAVOYSKIY, V.I.

Determining the deoxidizing properties of elements by the electromotive force method. Izv. vys. ucheb. zav.; chern. met. 6 no.9:50-54 '63. (MIRA 16:11)

1. Moskovskiy institut stali i splavov.

U DIN-FEN' [Wu Ting-fên]; VISHKAREV, A.F.; YAVOYSKIY, V.I.

Density of molten steelmaking slag. Izv. vys. ucheb. zav.; chern. met. 5 no.9:66-75 '62. (MIRA 15:10)

1. Moskovskiy institut stali i splavov.
(Slag—Density)

VISHKAREV, A. F., KRYAKOVSKIY, Yu. B.,

"The use of rere-earth metals for improving steel properties and on the deoxidizing properties of rare-earth metals and their effect on the nature of inclusions."

report presented at the Conf. on New Trends in the Study and Applications of Rare Earth Metals, Moscow, 18-20 Mar 63

U DIN-FEN' [Wu Ting-fên]; VISHKAREV, A.F.; YAVOYSKIY, V.I.

Surface tension of phosphate slags. Izv. vys. ucheb. zav.; chern. met. 6 no.3:40-45 '63. (MIRA 16:5)

1. Moskovskiy institut stali i splavov.
(Slag) (Surface tension)

KINNE, G.; VISHKAREV, A.F.; YAVOYSKIY, V.I.

Thermodynamics of steel deoxidation by lanthanum, cerium, praseodymium, and neodymium. Izv. vys. ucheb. zav.; chern. met. 5 no.9:92-98 '62. (MIRA 15:10)

1. Moskovskiy institut stali i splavov.
(Steel—Metallurgy) (Rare earth metals)

L 11071-63 EWP(q)/EWT(m)/BDS--AFFTC/ASD--JD/JG
ACCESSION NR: AP3001375 S/0148/63/000/005/0065/0069

58
57

AUTHOR: Kinne, G.; Vishkarev, A. F.; Yavoiskiy, V. I.

TITLE: Deoxidizing capacity of rare-earth elements (lanthanum, cerium, praseodymium and neodymium)

SOURCE: IVUZ. Chernaya metallurgiya, no. 5, 1963, 65-69

TOPIC TAGS: rare-earth elements, lanthanum, cerium, praseodymium, neodymium, deoxidation, aluminum, calcium, magnesium, deoxidation constants, smelting temperature, beryllium, zirconium

ABSTRACT: The rare-earth elements lanthanum, cerium, praseodymium, and neodymium exhibit deoxidizing capacities exceeding those of aluminum and zirconium even approach the activity of calcium and magnesium. Predictions of activity from thermodynamic calculations are borne out by the experimental results. The deoxidation mechanism was studied indirectly, by conducting smelting operations in an Al sub 2 O sub 3 crucible, with the material studied and the crucible material achieving equilibrium within 15-25 minutes, when measurements were made. Deoxidation constants for the four rare earth elements are given as a function of smelting temperature; comparative information for beryllium and zirconium are also provided. Orig.

Moscow Inst. of Steel and Alloys

Card 1/2

12846-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/JG
ACCESSION NR: AP3001467 S/0133/63/000/005/0422/0425 76 67

AUTHOR: Yavoyskiy, V. I. (Dr. of technical sciences); Matevosyan, P. A. (Engineer) Kryakovskiy, Yu. V. (Candidate of technical sciences); Tyurin, Ye. I. (Candidate of technical sciences); Vishkarev, A. F. (Candidate of technical sciences); Permyakov, L. N. (Engineer); Antipov, K. I. (Engineer)

TITLE: Use of rare-earth elements in smelting of structural alloy steel and of tainless steel 27

SOURCE: Stal', no. 5, 1963, 422-425

TOPIC TAGS: Ce, La, Nd, Pr, Ni, Armco-iron, steel Kh23N18, steel KhGSA, steel 1Kh18N9T, steel 12Kh1MF, steel 40Kh, flake formation, steel 37KhS, steel 36G2S, steel 30KhSA

ABSTRACT: The influence of rare-earth elements on properties of different kinds of steel was investigated at Moskovskiy institut stali i splavov (Moscow Institute of Steel and Alloys). Ce, La, Nd, and Pr were used separately in the form of an alloy (45-55% Ce, up to 28% La, and up to 15% Nd). Laboratory tests indicated that Ce and La lowered the surface tension of molten steel. 14

Card 1/2

L 12846-63
ACCESSION NR: AP3001467

15

It was shown that rare-earth elements used in metallurgy (up to 0.3%) do not change the concentration of hydrogen dissolved in molten steel. These elements formed stable nitrides and had a deoxidizing and desulfurizing effect on Armco-iron, on steel Kh23N18, and on steel 30KhGSA. The steel smelted with rare-earth elements was twice as tough as without them. The aftercharge of rare-earth elements improved the elasticity of stainless steel Kh23N18 and reduced the total amount of nonmetallic impurities. Moreover, 1% of Ni was saved, without any loss of elasticity, when rare-earths were added in making the steel 1Kh18N9T, while the addition of rare-earths to a number of structural alloy steels (30KhGSA, 12Kh1MF, 40Kh) improved their elasticity. An addition of up to 1.5 kg/t of rare-earths reduced but did not eliminate the formation of flakes in steel 37KhS, 36G2S, and 30KhSA. However, adding up to 2.7-2.8 kg/t the formation of flakes was completely eliminated. "The melts were made with the assistance of M. N. Kul'kova, B. S. Petrov, M. P. Lapshova, G. D. Shury*gin, V. A. Grigor'yev, B. N. Okorkov, A. M. Yakushev, P. N. Balashev, G. R. Openevich, and others." Orig. art. has: 2 figures and 5 tables.

Card 2/2