system $\frac{\partial u}{\partial t} = A\frac{\partial v}{\partial x}$, $\frac{\partial v}{\partial t} = B\frac{\partial u}{\partial x}$ for automatic calculating equipments the following scheme is recommended :

$$(1)\begin{cases} u^0 = u_0 + \frac{\tau A}{2h}(v_1 - v_{-1}) + \frac{\tau\sqrt{AB}}{2h}(u_1 - 2u_0 + u_{-1}) \\ v^0 = v_0 + \frac{\tau B}{2h}(u_1 - u_{-1}) + \frac{\tau\sqrt{AB}}{2h}(v_1 - 2v_0 + v_{-1}) \end{cases}$$

In the case of acoustic waves the author gives an interesting physical interpretation for (1) which then is used in Chapter II in order to obtain the difference scheme for plane unidimensional instationary hydromechanic Lagrange equations

$$\frac{\partial u}{\partial t} + B\frac{\partial p(v,E)}{\partial x} = 0 \ ; \ \frac{\partial v}{\partial t} - B\frac{\partial u}{\partial x} = 0 \ ; \ \frac{\partial\left(E + \frac{u^2}{2}\right)}{\partial t} + B\frac{\partial pu}{\partial x} = 0$$

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Difference Methods for the Numerical Calculation of the Discontinuous Solutions of Hydrodynamic Equations SOV/39-47-3-2/4

Since the system can possess nonsmooth solutions even for continuous initial conditions, generalized solutions (due to Sobolev) with impact waves are included in the consideration. It is proved that the proposed scheme under convergence tends to these generalized solutions. Numerous single properties of the scheme and experiences of calculation are given. The scheme is used by Soviet electronic computers. The author remarks that similar methods have been developed by N.N. Yanenko. He furthermore mentions L.I. Sedov and A.F.Filippov. There are 7 figures and 4 references, 2 of which are Soviet and 2 American.

SUBMITTED: March 20, 1956

Card 3/3

GODUNOV, S. K., ZHUKOV, A. I., SEMENDYEV, K. A. (Moscow)

"Numerical Methods in the Analysis of One-Dimensional Unsteady Problems of Gas Dynamics."

report presented at the First All-Union Congress on Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb 1960.

84659

16.3500 16.4100

S/020/60/134/006/002/031
C111/C222

AUTHOR: Godunov, S.K.

TITLE: On the Concept of Generalized Solution

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 6, pp. 1279 - 1282

TEXT: The author considers the quasilinear hyperbolic system 16

$$\frac{\partial F_i(q_1,q_2,\dots,q_n)}{\partial t} + \frac{\partial G_i(q_1,q_2,\dots,q_n)}{\partial x} = 0 \tag{1}$$

X

Generalized solutions are those $q_1(x,t)$, $q_2(x,t),\dots,q_n(x,t)$, for which on each contour it holds

$$\oint F_i\, dx - G_i\, dt = 0 .$$

However, it is senseless to denote all functions which satisfy this con-

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On the Concept of Generalized Solution S/020/60/134/006/002/031
C111/C222

dition as solutions. I.M. Gel'fand (Ref. 1) proposed to denote those among the $q_i$ as solutions which one obtains as limit values for $\varepsilon \longrightarrow +0$ from the solutions of

$$\frac{\partial F_i}{\partial t} + \frac{\partial G_i}{\partial x} = \frac{\partial}{\partial x}\left( \varepsilon\, b_{ik}\, \frac{\partial q_k}{\partial x} \right) \quad (2)$$

Such a definition would have a sense if it would be fixed uniquely by (1) and if the matrix $\| b_{ik} \|$ would not influence the result of the limiting process.
By an example the author shows that this is not the case. The fact that (1) is hyperbolic is not sufficient in order to guarantee the uniqueness of the mentioned limiting process (its independence of $\| b_{ik} \|$).

There is 1 figure and 1 Soviet reference.

SUBMITTED: May 30, 1960

Card 2/2

GODUNOV, S.K. (Moskva)

Evaluation of the inaccuracies occurring in the derivation of approximate solutions to simple equations of gas dynamics. Zhur. vych.mat.i mat.fiz. 1 no.4:622-637 Jl-Ag '61. (MIRA 14:8)
(Approximate computation) (Differential equations)
(Gas dynamics)

3110.8
S/208/61/001/006/005/013
B112/B138

10 1410

AUTHORS: Godunov, S. K., Zabrodin, A. V., Prokopov, G. P. (Moscow)

TITLE: Difference scheme for two-dimensional non-stationary problems of gas dynamics and calculation of a flow with a shock wave that runs backward

PERIODICAL: Zhurnal vychislitel'noy matematiki i matematicheskoy fiziki, v. 1, no. 6, 1961, 1020-1050

TEXT: In this paper, the authors continue investigations of difference schemes for non-stationary problems of gas dynamics (cf. S. K. Godunov. Matem. sb., 1959, 47, no. 3, 271-306). In order to solve the system

$$\iiint \rho\, dx\, dy + \rho u\, dy\, dt + \rho v\, dx\, dt = 0,$$

$$\iiint \rho u\, dx\, dy + (p + \rho u^2)\, dy\, dt + \rho uv\, dx\, dt = 0, \qquad (2.2)$$

$$\iiint \rho v\, dx\, dy + \rho uv\, dy\, dt + (p + \rho v^2)\, dx\, dt = 0,$$

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31108
S/208/61/001/006/005/013
B112/B138

Difference scheme for two-dimensional...

$$\iint \rho\left(e+\frac{u^2+v^2}{2}\right)dx\,dy + \rho u\left(e+\frac{p}{\rho}+\frac{u^2+v^2}{2}\right)dy\,dt + \rho v\left(e+\frac{p}{\rho}+\frac{u^2+v^2}{2}\right)dx\,dt = 0 \qquad (2.2),$$

the authors use the following difference scheme

| | | | | | |
|---|---|---|---|---|---|
| $n-3/2$, $m+3/2$ | $n-1/2$, $m+3/2$ | $n+1/2$, $m+3/2$ | $n+3/2$, $m+3/2$ | $n+5/2$, $m+3/2$ | $h_y$ |
| $n-3/2$, $m+1/2$ | $n-1/2$, $m+1/2$ | $n+1/2$, $m+1/2$ | $n+3/2$, $m+1/2$ | $n+5/2$, $m+1/2$ | $h_y$ |
| $n-3/2$, $m-1/2$ | $n-1/2$, $m-1/2$ | $n+1/2$, $m-1/2$ | $n+3/2$, $m-1/2$ | $n+5/2$, $m-1/2$ | $h_y$ |
| $h_x$ | $h_x$ | $h_x$ | $h_x$ | $h_x$ | |

Card 2/3

Discontinuity disintegration is calculated using the scheme

$$a_n = b_n = \sqrt{\gamma \frac{p_{n-1/2} + p_{n+1/2}}{2} \frac{\rho_{n-1/2} + \rho_{n+1/2}}{2}},$$

$$p_{\text{к.р.}} = \frac{p_{n+1/2} + p_{n-1/2}}{2} + a_n \frac{u_{n+1/2} - u_{n-1/2}}{2}, \qquad (3.3)$$

$$u_{\text{к.р.}} = \frac{u_{n+1/2} + u_{n-1/2}}{2} + \frac{p_{n+1/2} - p_{n-1/2}}{2a_n}.$$

It is based on the formula $p = (\gamma - 1)\rho e$. The stability condition of the scheme is derived. In the latter part of the article, the authors use nets which are moved in accordance with the flow. Cases of axial symmetry, in particular that of a sphere, are considered. I. G. Petrovskiy, O. M. Belotserkovskiy (Prikl. matem. i mekhan., 1960, 24, no. 3, 511-517), and A. A. Dorodnitsin are mentioned. I. M. Gel'fand, K. A. Bagrinovskiy, G. N. Novozhilov, V. V. Lutsikovich, and K. A. Semendayev are thanked for assistance. There are 15 figures and 3 Soviet references.

SUBMITTED: May 7, 1961

22175

S/042/61/016/003/004/005
C111/C444

16.6500 16.3400

AUTHOR: Godunov S. K.

TITLE: On the numerical solution of boundary value problems for systems of linear ordinary differential equations.

PERIODICAL: Uspekhi matematicheskikh nauk, v.16, no.3, 1961, 171-174.

TEXT: Proposed is a numerical method for the solution of boundary value problems.

$$y' = A(x)y + f(x)$$
$$By(0) = 0, \quad Cy(1) = 0$$

where y,f are vectors and A,B,C are matrices. The interval [0,1] is divided by points $0 = x_0 < x_1 < x_2 \ldots < x_n = 1$. $M_s\ z_o\ (x_s)$ be the result of the integration of the system $y' = Ay + f$ with the initial conditions $y(x_s) = z_o(x_s)$ from $x = x_s$ to $x = x_{s+1}$. Let $z_j(x_o) = y_j(0)$ $(j = 0,1,2,\ldots,k)$. If integrating the equations from $x_o$ to x, one gets

$$n_j\ (x_1) = M_o\ z_j\ (x_o) \qquad (j = 0,1,2,\ldots,k)$$

The vectors $n_1(x_1)$, $n_2\ (x_1), \ldots,\ n_k\ (x_1)$ have to be orthogonalized

Card 1/5

and normed. The obtained vectors be $z_1(x_1)$, $z_2(x_1), \ldots z_k(x_1)$. The orthogonalisation formulas are

$$\omega_{11} = \sqrt{(u_1, u_1)},$$

$$z_1 = \frac{u_1}{\omega_{11}};$$

$$\omega_{21} = (u_2, z_1), \quad \omega_{22} = \sqrt{(u_2, u_2) - \omega_{21}^2},$$

$$z_2 = \frac{1}{\omega_{22}}(u_2 - \omega_{21} z_1);$$

$$\omega_{31} = (u_3, z_1), \quad \omega_{32} = (u_3, z_2), \quad \omega_{33} = \sqrt{(u_3, u_3) - \omega_{31}^2 - \omega_{32}^2},$$

$$z_3 = \frac{1}{\omega_{33}}(u_3 - \omega_{31} z_1 - \omega_{32} z_2);$$

. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

$$z_k = \frac{1}{\omega_{kk}}(u_k - \omega_{k1} z_1 - \omega_{k2} z_2 - \ldots - \omega_{k,k-1} z_{k-1});$$

$$\omega_{01} = (u_0, z_1), \quad \omega_{02} = (u_0, z_2), \ldots, \omega_{0k} = (u_0 z_k),$$

$$z_0 = u_0 - \omega_{01} z_1 - \omega_{02} z_2 - \ldots - \omega_{0k} z_k.$$

The orthogonalisation is noted in general by N, by $N^{(s)}$ in the point $x_s$. By application of $N^{(s)}$ one gains the triangular matrix.

$$\Omega^{(s)} = \begin{pmatrix} \omega_{11}^{(s)} & \omega_{21}^{(s)} & \omega_{31}^{(s)} & \dots & \omega_{k-1,1}^{(s)} & \omega_{k,1}^{(s)} & \omega_{01}^{(s)} \\ & \omega_{22}^{(s)} & \omega_{32}^{(s)} & \dots & \omega_{k-1,2}^{(s)} & \omega_{k,2}^{(s)} & \omega_{02}^{(s)} \\ & & \omega_{33}^{(s)} & \dots & \omega_{k-1,3}^{(s)} & \omega_{k,3}^{(s)} & \omega_{03}^{(s)} \\ \dots & \dots & \dots & \dots & \dots & \dots & \dots \\ & 0 & & & \omega_{k-1,k-1}^{(s)} & \omega_{k,k-1}^{(s)} & \omega_{0,k-1}^{(s)} \\ & & & & & \omega_{kk}^{(s)} & \omega_{0k}^{(s)} \\ & & & & & & 1 \end{pmatrix}.$$

By aid of integrations and orthogonalisations the following sequence is constructed.

$$\left\{ z_j(x_1) \right\} = N^{(1)} \left\{ M_0 \; z_j(x_0) \right\}, \left\{ z_j(x_2) \right\} = N^{(2)} \left\{ M_1 \; z_j(x_1) \right\}$$

$$\left\{ z_j(x_n) \right\} = N^{(n)} \left\{ M_{n-1} z_j(x_{n-1}) \right\}, \quad j = 0,1,2,\dots,k$$

Every solution of $y' = Ay + f$, satisfying the boundary conditions on

the left end, will get the value $y(1) = z_o(x_n) + \sum_{j=1}^{k} \beta_j^{(n)} z_j(x_n)$ on the right end. The coefficients $\beta_j^{(n)}$ are obtained from the system $Cy(1) = 0$. The calculation of the solution in $x_s$, $s = 0,1,2,\dots,n$ follows by formula $y(x_s) = z_n(x_s) + \sum_{j=1}^{k} \beta_j^{(s)} z_j(x_s)$, where $\beta_j^{(s)}$ is recurrently obtained from $\beta_j^{(s+1)}$ by aid of the matrix $\Omega^{(s+1)}$.
Let

$$\beta^{(s)} = \begin{pmatrix} \beta_1^{(s)} \\ \beta_2^{(s)} \\ \vdots \\ \beta_\alpha^{(s)} \\ 1 \end{pmatrix}$$

then the recurrence formula is $\Omega^{(s+1)} \beta^{(s)} = \beta^{(s+1)}$.

The author thanks I. A. Adamskaya and I. E. Shnol' for the numerical

24175

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C111/C444

On

On the numerical solution ...

calculations and for discussions.

There are 7 Soviet-bloc references.

SUBMITTED: October 31, 1959.

Card 5/5

89599

S/020/61/136/002/002/034
C 111/ C 333

16.3500

AUTHOR: Godunov, S. K.

TITLE: No Unique "Blurring" of Discontinuities in Solutions to Quasilinear Systems

PERIODICAL: Doklady Akademii nauk SSSR, 1961, Vol. 136, No. 2, pp. 272-273

TEXT: The author considers differential equations which describe the "blurring" of the discontinuities in quasilinear hyperbolic systems. In order that a "blurring" takes place, the right sides of

$$(1) \qquad \frac{\partial F_i(q_1, q_2, \dots, q_n)}{\partial t} + \frac{\partial G_i(q_1, q_2, \dots, q_n)}{\partial x} = 0$$

must be replaced by the viscosity terms $\frac{\partial}{\partial x_t}(\varepsilon \sum b_{ik} \cdot \frac{\partial q_k}{\partial x})$.
If one seeks solutions of the form $q_j = q_j(\frac{t - \alpha x}{\varepsilon}) = q_j(\tau)$, then one obtains ordinary differential equations (see (Ref.1)).
The author shows that reasonable $\| b_{ik} \|$ can exist for which the solution describing the "blurred" discontinuity is not unique.

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S/020/61/136/002/C02/034
C 111/ C 333

No Unique "Blurring" of Discontinuities in Solutions to Quasilinear Systems

The system

$$\frac{\partial L_{q_i}}{\partial t} + \frac{\partial L^1_{q_i}}{\partial x} = \frac{\partial}{\partial x}\left(\varepsilon \sum b_{ik} \frac{\partial q_k}{\partial x}\right), \tag{2}$$

with

$$L = q_1^2 + 3q_2^2 + 5q_3^2 + 2e^{q_1} + 4e^{q_2} + 6e^{q_3},$$

$$L^1 = q_1^2 + q_2^2 + q_3^2 + e^{q_1} + e^{q_2} + e^{q_3},$$

is hyperbolic for $\varepsilon = 0$. In order that (2) with $\varepsilon > 0$ be an evolution system in linear approximation it is sufficient that $\| b_{ik} \|$ is positive definite. The equations for solutions $q_i = q_i(t)$ of (2) are:

$$\Lambda q_i = -\alpha^2 D_{\sigma_i} \tag{3}$$

$$dq_i = -\sigma_i d\tau,$$

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S/020/61/136/002/002/034
C 111/ C 333

No Unique "Blurring" of Discontinuities in Solutions to Quasilinear Systems

where

$\Lambda = L - \alpha L^1 - A_1 q_1 - A_2 q_2 - A_3 q_3$; $D = \frac{1}{2} \sum b_{ik} \sigma_i \sigma_k$; $A_i$ are integration constants. The trajectories defined in the space $(q_1, q_2, q_3)$ by (3) are orthogonal in the sense of the metric D to the equipotential surfaces of the function $\Lambda$. To the "blurred" discontinuities there correspond $q_i(\tau)$ which tend to finite boundary values for $\tau \to \pm\infty$ which are stationary points of the function $\Lambda(q_1, q_2, q_3)$. The author puts $\alpha = 7/2$, $A_1 = -3/2$, $A_2 = 0$ and $A_3 = 1/2$, and shows by topological investigation of the equipotential surfaces and of the structure of certain critical points that under variation of the metric D one can attain a nonuniqueness of the trajectories which describe the "blurred" discontinuity. There are 2 figures, and 1 Soviet reference.

[Abstracter's note: (Ref.1) is a paper of J. M. Gel'fand in Uspekhi matematicheskikh nauk, 1959, Vol. 14, No. 2].

PRESENTED: June 30, 1960, by M. V. Keldysh, Academician

SUBMITTED: June 21, 1960

Card 3/3

GODUNOV, S.K.

Instance of nonuniqueness for a nonlinear parabolic system.
Dokl. AN SSSR 136 no.6:1281-1282 F '61. (MIRA 14:3)

1. Predstavleno akademikom I. G. Petrovskim.
(Differential equations)

16.3500

25702
S/020/61/139/003/001/025
C111/C222

AUTHOR: Godunov, S.K.

TITLE: An interesting class of quasi-linear systems

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 139, no. 3, 1961, 521-523

TEXT: The author points to a class of differential equations including a number of essential equations of mathematical physics and being suitable for the foundation of a mathematical theory.
The equations of the reversible processes belonging to this class have the form

$$\frac{\partial L_{q_i}}{\partial t} + \sum_j \frac{\partial L^j_{q_i}}{\partial x_j} = 0 \quad , \qquad (1)$$

where $L = L(q_1, q_2, \ldots, q_n)$ , $L^j = L^j(q_1, q_2, \ldots, q_n)$.
The following equations lead to this class :
1. Variation equations of Lagrange

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An interesting class ...

$$\frac{\partial}{\partial t}\left(\frac{\partial \mathcal{L}}{\partial u_t^{(k)}}\right) + \frac{\partial}{\partial x_1}\left(\frac{\partial \mathcal{L}}{\partial u_{x_1}^{(k)}}\right) + \frac{\partial}{\partial x_2}\left(\frac{\partial \mathcal{L}}{\partial u_{x_2}^{(k)}}\right) = 0 ,$$

$$\mathcal{L} = \mathcal{L}(u_t^{(1)}, u_{x_1}^{(1)}, u_{x_2}^{(1)}, u_t^{(2)}, \ldots, u_{x_2}^{(n)}) .$$

For a reduction put

$$q_{3k} = u_t^{(k)}, \quad q_{3k-1} = -\frac{\partial \mathcal{L}}{\partial u_{x_1}^{(k)}}, \quad q_{3k-2} = -\frac{\partial \mathcal{L}}{\partial u_{x_2}^{(k)}},$$

$$L = \mathcal{L} - \sum_k \left[u_{x_1}^{(k)} \frac{\partial \mathcal{L}}{\partial u_{x_1}^{(k)}} + u_{x_2}^{(k)} \frac{\partial \mathcal{L}}{\partial u_{x_2}^{(k)}}\right], \quad L^1 = \sum_k u_t^{(k)} \frac{\partial \mathcal{L}}{\partial u_{x_1}^{(k)}}, \quad L^2 = \sum_k u_t^{(k)} \frac{\partial \mathcal{L}}{\partial u_{x_2}^{(k)}}$$

2. Differential equations of crystal optics.
3. Equations of gas dynamics

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An interesting class ...

$$\frac{\partial \rho u_1}{\partial t} + \frac{\partial (\rho u_1^2 + p)}{\partial x_1} + \frac{\partial \rho u_1 u_2}{\partial x_2} + \frac{\partial \rho u_1 u_3}{\partial x_3} = 0,$$

$$\frac{\partial \rho u_2}{\partial t} + \frac{\partial \rho u_2 u_1}{\partial x_1} + \frac{\partial (\rho u_2^2 + p)}{\partial x_2} + \frac{\partial \rho u_2 u_3}{\partial x_3} = 0,$$

$$\frac{\partial \rho u_3}{\partial t} + \frac{\partial \rho u_3 u_1}{\partial x_1} + \frac{\partial \rho u_3 u_2}{\partial x_2} + \frac{\partial (\rho u_3^2 + p)}{\partial x_3} = 0,$$

$$\frac{\partial \rho}{\partial t} + \frac{\partial \rho u_1}{\partial x_1} + \frac{\partial \rho u_2}{\partial x_2} + \frac{\partial \rho u_3}{\partial x_3} = 0,$$

$$\frac{\partial \rho \left(E + \frac{u_1^2 + u_2^2 + u_3^2}{2}\right)}{\partial t} + \frac{\partial \rho u_1 \left(E + \frac{p}{\rho} + \frac{u_1^2 + u_2^2 + u_3^2}{2}\right)}{\partial x_1} +$$

$$+ \frac{\partial \rho u_2 \left(E + \frac{p}{\rho} + \frac{u_1^2 + u_2^2 + u_3^2}{2}\right)}{\partial x_2} + \frac{\partial \rho u_3 \left(E + \frac{p}{\rho} + \frac{u_1^2 + u_2^2 + u_3^2}{2}\right)}{\partial x_3} = 0.$$

For a reduction put

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An interesting class ...

$$q_1 = \frac{u_1}{T}, \quad q_2 = -\frac{u_2}{T}, \quad q_3 = -\frac{u_3}{T},$$

$$q_4 = S - \frac{E + \frac{p}{\varsigma} - \frac{u_1^2 + u_2^2 + u_3^2}{2}}{T}, \quad q_5 = \frac{1}{T},$$

$$L = -\frac{p}{T}, \quad L^1 = -\frac{u_1 p}{T}, \quad L^2 = -\frac{u_2 p}{T}, \quad L^3 = -\frac{u_3 p}{T}.$$

The systems (1) can be written in the form

$$\sum_k L_{q_i q_k} \frac{\partial q_k}{\partial t} + \sum_{j,k} L^j_{q_i q_k} \frac{\partial q_k}{\partial x_j} = 0 \qquad (2)$$

wherefrom it follows that on a convex $L(q_1, q_2, \ldots, q_n)$ they are a natural

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nonlinear generalization of the symmetrical systems of K.O. Friedrichs (Ref. 1 : Comm. on pure and Appl. Math., 7, no. 2 (1954)). The correctness of the system (1) can be proved with the aid of the energy integrals for the derivatives.

The equations of the irreversible systems can be obtained from (1) by adding of dissipative terms

$$\frac{\partial L_{q_i}}{\partial t} + \sum_j \frac{\partial L^j_{q_i}}{\partial x_j} = \sum_{j,k,s} \frac{\partial}{\partial x_j} b^{js}_{ik} \frac{\partial q_k}{\partial x_s} \quad ; \qquad (3)$$

the matrix $\| b^{js}_{ik} \|$ is symmetrical in j,s and i,k, furthermore it is positive definite. The symmetry follows from the conditions of Onsager for irreversible processes.

The author mentions I.G. Petrovskiy. There are 6 Soviet-bloc and 3 non-Soviet-bloc references. The reference to the English-language publication reads as follows : K.O. Friedrichs, Comm. on Pure and Appl. Math., 7, no. 2 (1954).

PRESENTED: March 17, 1961, by I.G. Petrovskiy, Academician
SUBMITTED: March 7, 1961

GODUNOV, S.K.

[Difference methods of solving gas dynamics equations; Raznostnye metody resheniia uravnenii gazovoi dinamiki; lektsii dlia studentov NGU. Novosibirsk, Novosibirskii gos. univ., 1962. 96 p. (MIRA 17:8)

PHASE I BOOK EXPLOITATION SOV/6404

Godunov, Sergey Konstantinovich, and Viktor Solomonovich Ryaben'kiy

Vvedeniye v teoriyu raznostnykh skhem (Introduction to the Theory of Difference Schemes) Moscow, Fizmatgiz, 1962. 340 p. 10,000 copies printed.

Ed.: G. I. Biryuk; Tech. Ed.: L. Yu. Plaksh.

PURPOSE: This book is intended for mathematicians who have to solve partial differential equations and for students of the third and more advanced university courses. The introduction and chapter I are intended for less qualified readers and may be used in the training of technicians in computation.

COVERAGE: This book develops the concepts and techniques used in the solution of differential equations by finite-difference methods. It covers basic theory of difference equations, convergence of their solutions to the solution of differential

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equations, stability of difference schemes, the order of approximation, the application of finite-difference schemes to partial differential equations, and the stability of difference schemes applied to the solution of equations of nonstationary processes by use of the spectral theory of difference operators. No personalities are mentioned. There are 45 references: 37 Soviet (including 2 translations, 1 from the English, 1 from the German), 5 English, and 3 German. The appendices are accompanied by 23 references: 14 Soviet, 8 English, and 1 German.

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S/208/62/002/001/001/016
D299/D303

16.6500 1103, 1327

AUTHORS: Godunov, S.K., and Semendyayev, K.A. (Moscow)

TITLE: Difference methods for the numerical solution of gasdynamic problems

PERIODICAL: Zhurnal vychislitel'noy matematiki i matematicheskoy fiziki, v. 2, no. 1, 1962, 3 - 14

TEXT: Various numerical methods and their range of applicability are considered and some unsolved problems are discussed. In case of moving singularities, it is convenient to use moving grids. connected with the singularities; thereby it becomes unnecessary to artificially introduce independent variables. For one-dimensional problems. Lagrangian coordinate-grids are more suitable in this respect (than Eulerian). Moving grids are used in one-dimensional problems involving contact discontinuities and in unsteady-flow problems past cylindrical bodies. A particular type of moving grid (for one dimensional problems), is the one formed by 2 families of characteristics. However, the method of characteristics is not satisfac-

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Difference methods for the ...

tory, because it does not adequately take into account the smoothness of the sought-for functions. The authors developed a computational method, whereby the grid of the 3 families of characteristics is associated with the straight lines t = const. This method however, was not further elaborated as it cannot be extended to the general equations of state. With regard to the various difference-schemes, by which the gasdynamics equations are approximated, the optimization problem (i.e. how to obtain results of the desired degree of accuracy with the least amount of computational work) has been quite insufficiently studied in technical literature. Further, the criteria are discussed for the choice of variables. As an example, a difference scheme is considered for calculating a centered expansion wave in the (above-mentioned) grid, i.e. the lines t = const. and the family of characteristics issuing from the wave center. The possibilities inherent in the use of electronic computers for solving gasdynamics problems are considered, as well as methods of continued calculation. These methods involve the introduction of "viscosity" in the differential equations. It is assumed that the equation of state is convex (i.e. the Bethe-Weyl condition is sa-

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tisfied). In this case it can be assumed that a unique generalized solution exists, although this is not proved. Thereby the main difficulty is the possible accumulation of singularities. The character of such an accumulation was neither studied by purely mathematical methods, nor by applied methods. In this connection, the possible continuation of the solution (through the singularities which were smoothed), deserves particular attention. Further, the convergence of the series solution is considered. The authors made an experimental calculation of expansion waves in a local second-order of accuracy scheme. Thereby it was found that the orders of weak- and of strong convergence coincided. It is noted that for the further development of computational methods based on the use of the generalized solution, it is necessary to first render more exact the latter concept. It is also noted that expansion waves are not dealt with in literature concerned with methods of continued calculation, although difference methods yield particularly inadequate convergence for expansion waves. The above considerations regarding the one-dimensional problem, fully apply to multi-dimensional problems, too. The numerical methods should be based on the concept

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S/208/62/002/001/001/016
D299/D303

Difference methods for the ...

of general solution, but should at the same time make allowance for the rough structure of the solution. With respect to the choice of the grids and variables, A.A. Dorodnitsyna's method of integral relationships is recommended (Ref. 11: O.M. Belotserkovskiy, Raschet obtekaniya krugovogo tsilindra s otoshedshey udarnoy volnoy. Sb. "Vychisl. matem.", M., Izd-vo AS SSSR, 1959, no. 3, 149-185). This method yields a high order of accuracy, using 2-3 computation points only. Further, the advantages and disadvantages of explicit- and implicit difference schemes are considered. The relation between the steady- and unsteady flow-problems is discussed. (Above, unsteady problems were considered). A flexible method is proposed, whereby the suitable variables can be selected (in the difference scheme), irrespective of the equations of state. This is achieved by using a separate (general) subprogram for the equations of state. In conclusion it is noted that basic theoretical problems have yet to be cleared up, in particular those related to the concept of solving the relevant equations, the classes of functions met in the solutions, and the approximate methods of representing these functions on grids. The opinions expressed in this

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Difference methods for the ...

article were formed during numerous discussions in which mathematicians including Keldysh, Gel'fand, Babenko, D yachenko took part. There are 16 references: 13 Soviet-bloc and 3 non-Soviet-bloc. (including 2 translations). The reference to the English-language publication reads as follows: J. Neumann, R. Richtmeyer, A method for the numerical calculations of hydro-dynamic shocks. J. Appl. Phys., 1950, 21, no. 3, 232 - 237.

SUBMITTED: October 19, 1961

X

Card 5/5

GODUNOV, S.K, (Moskva); ZABRODIN, A.V. (Moskva)

Difference schemes of second-order accuracy for multidemensional problems. Zhur.vych.mat.i mat.fiz. 2 no.4:706-708 Jl-Ag '62.
(MIRA 15:8)

(Difference equations)

42756

S/208/62/002/006/002/007
B112/B186

AUTHOR: Godunov, S. K. (Moscow)

TITLE: Method of orthogonalization for solving of systems of difference equations

PERIODICAL: Zhurnal vychislitel'noy matematiki i matematicheskoy fiziki, v. 2, no. 6, 1962, 972-982

TEXT: Difference equations of the form

$$Lu_0 = \varphi, \quad Ru_N = \Psi,$$
$$A_{n-1/2}u_{n-1} + B_{n-1/2}u_n = f_{n-1/2} \quad (n = 1,2,\ldots,N), \qquad (1)$$
$$Ru_N = \psi;$$

are considered. The solution algorithm is the following:

$$y_s^{(o)} = B^{-1}_{s-1/2}(f_{s-1/2} - A_{s-1/2}z^{(o)}_{s-1},$$

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Method of orthogonalization for ...

$$y_s^{(j)} = -B^{-1}_{s-1/2}A_{s-1/2}z^{(j)}_{s-1} \qquad (j = 1,2,\ldots,k)$$

The vectors $z_s^{(1)}, z_s^{(2)},\ldots, z_s^{(k)}$ are obtained from the vectors $y_s^{(1)}$, $y_s^{(2)},\ldots, y_s^{(k)}$ by orthogonalization and normalization. The vectors $z_o^{(1)}$, $z_o^{(2)},\ldots,z_o^{(s)}$ constitute a complete system of orthonormalized vectors satisfying the condition $Lz_o^{(j)} = 0$ $(j=1,2,\ldots,k)$. The vector $z_o^{(o)}$ is perpendicular to $z_o^{(1)}, z_o^{(2)},\ldots,z_o^{(s)}$ and fulfills the inhomogeneous equation $Lz_o^{(o)} = \varphi$. The error of the process is estimated under certain restrictions concerning the difference scheme applied. I is found to be relatively small. The subject of the paper resulted from a discussion at the Moskovskiy universitet (Moscow University) in 1960, initiated by N. S. Bakhvalov who suggested a method for orthogonalization of scalar equations of the type $a_n u_{n-1} + b_n u_n + c_n u_{n+1} = f_n$ (cf. S. K. Godunov, V. S. Ryaben'kiy.

Card 2/3

Method of orthogonalization for ... S/208/62/002/006/002/007
B112/B186

Vvedeniye v teoriyu raznostnykh skhem (Introduction into the theory of difference schemes) M., Fizmatgiz [now printing]).

SUBMITTED: May 30, 1962

Card 3/3

S/042/62/017/003/002/002
B125/B104

AUTHOR: Godunov, S. K.

TITLE: The problem of a generalized solution in the theory of quasilinear equations and in gas dynamics

PERIODICAL: Uspekhi matematicheskikh nauk, v. 17, no. 3(105), 1962, 147-158

TEXT: This review deals with applications of the general solutions of $\frac{\partial u}{\partial t} - \frac{\partial u}{\partial x} = 0$ to gas dynamics. S. L. Sobolev introduced this concept of a generalized solution in the course of an attempt to eliminate the condition of smoothness from the general solution $u = f(x+t)$. The solution to a given differential equation can be generalized in various ways. The difficulties caused by the ambiguity of the generalized solutions to the Cauchy problem can be avoided by imposing additional limitations (e.g. integral conditions) on the generalized solutions. In thermodynamics, the problem of the integrating factor seems to follow from the conditions for correctness of the differential equations. Attempts to discover

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relationships between thermodynamics and the partial differential equations achieved success through a systematic classification of the different equations in mathematical physics. For systems that are symmetric in Friedrichs' sense of that word, a law similar to the law of conservation of entropy can be derived. The Lagrange-Euler variational equation can be written as a system of three equations. In the one-dimensional case, the system with dissipative terms is

$$\partial L_{q_i}/\partial t + \partial L^1_{q_i}/\partial x = (\partial/\partial x) b_{ik}(\partial q_k/\partial x) \qquad (6).$$

Here $\| b_{ik} \|$ is symmetric and positively definite matrix. The ordinary equations for solving (6) permit fine geometrical interpretations to be made. In gas dynamics, a meaningful concept of generalized solutions exists only for such equations of state as fulfil the conditions of Bethe and Weyl. The proof of the theorems of existence is very difficult. There are 4 figures.

SUBMITTED: December 19, 1961

GODUNOV, S.K.

Nonuniqueness for parabolic systems. Dokl.AN SSSR 145 no.3:498-500 Jl '62. (MIRA 15:7)

1. Predstavleno akademikom I.G.Petrovskim.
(Differential equations)

AID Nr. 986-11 10 June

CANONICAL FORMS OF SYSTEMS OF LINEAR ORDINARY DIFFERENCE EQUATIONS WITH CONSTANT COEFFICIENTS (USSR)

Godunov, S. K., and V. S. Ryaben'kiy. Zhurnal vychislitel'noy matematiki i matematicheskoy fiziki, v. 3, no. 2, Mar-Apr 1963, 211-232. S/208/63/003/002/001/014

A study is made of the systems of ordinary difference equations

$$\sum_{j=1}^{s}\sum_{i=1}^{l} c_{ij}^{k} v_{n+i} = f_n^k, \qquad n = 0, \pm 1, \dots; k = 1, 2, \dots, m \tag{1}$$

with respect to functions $v^j = \{v_n^j\}$ of the argument n, with the value $v_n^j$ taken as a point having an abcissa n and ordinate j. Canonical forms of the bundle of matrices $\alpha A + \beta B$, where $\alpha$ and $\beta$ are parameters and A and B are matrices, are analyzed. On the basis of this analysis, canonical forms of the difference equation

$$AU_n + BU_{n+1} = F_n, \tag{2}$$

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AID Nr. 986-11 10 June

CANONICAL FORMS OF SYSTEMS [Cont'd] S/208/63/003/002/001/014

where $U_n$ and $F_n$ are vectors, are presented, and their properties studied. It is shown that without changing its basic properties scalar system (1) can be reduced to a vector form (2) and that a unique solution of (1) corresponds to each solution of (2). Conditions for solving (1) are presented in the form of theorems. The reduction of the boundary value problem for (1) to that for (2) is investigated. [LK]

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GODUNOV, S.K.; RYABEN'KIY, V.S.

Spectral indications of the stability of boundary value problems for non-self-adjoint difference equations. Usp. mat. nauk 18 no.3:3-14 My-Je '63. (MIRA 16:10)

VASIL'YEV, O.F.; GODUNOV, S.K.; PRITVITS, N.A.; TEMNOYEVA, T.A.;
FRYAZINOVA, I.L.; SHUGRIN, S.M.

Numerical method for calculating the propagation of long waves in open river beds and its application to the flood problem. Dokl. AN SSSR 151 no.3:525-527 Jl '63. (MIRA 16:9)

1. Institut gidrodinamiki Sibirskogo otdeleniya AN SSSR. Predstavleno akademikom P.Ya.Kochinoy.

ACCESSION NR: AP4037252 S/0208/64/004/003/0473/0484

AUTHORS: Adamskaya, I. A. (Moscow); Godunov, S. K. (Moscow)

TITLE: Method of spherical harmonics in the problem of critical parameters

SOURCE: Zhurnal vy*chislitel'noy matematiki i matematicheskoy fiziki, v. 4, no. 3, 1964, 473-484

TOPIC TAGS: spherical harmonics, critical parameter, spherical reactor, multigroup approximation, reactor dimension

ABSTRACT: The authors study the problem of determining critical parameters of spherical reactors in a multi-group approximation by the method of spherical harmonics. The problem for 2n harmonics and m groups is reduced to a system of 2mn differential equations for 2 mn unknown functions $y_{ij}$, $i = 0, 1, \ldots, (2n-1)$, $j = 1, 2, \ldots, m$. The index i denotes the number of the harmonic, and j - the number of the group. The system of differential equations has the form

$$a_i \frac{dy_{i+1,j}}{dr} + b_i \frac{dy_{i-1,j}}{dr} + \frac{1}{r}(\gamma_i y_{i+1,j} + \delta_i y_{i-1,j}) + \frac{\lambda}{v_j} y_{ij} = \rho \sum_{k=1}^{m} d_{ij}^{k} u_k, \quad (1)$$

$$i = 0, 1, \ldots, (2n-1); \quad j = 1, 2, \ldots, m.$$

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APPROVED FOR RELEASE: 09/19/2001 CIA-RDP86-00513R000615520012-9"

ACCESSION NR: AP4037252

Here

$$a_i = \frac{i+1}{2i+1}, \quad b_i = \frac{i}{2i+1}, \quad \gamma_i = \frac{(i+1)(i+2)}{2i+1}, \quad \delta_i = -\frac{i(i-1)}{2i+1}, \qquad (2)$$

$v_j$ is the velocity of neutrons of the j-th group, $\lambda$ is a parameter (time constant of the system) and $\rho$ is density. Computing the variable $y_{ij}$ as the components of the vector y in 2mn dimensional space, the system can be rewritten as

$$P\frac{dy}{dr} + \frac{1}{r}Qy + \lambda Vy = \rho Dy, \qquad (3)$$

where P, Q, V, and D are matrices. The problem of finding critical parameters can be handled in the following manner. Considering strictly given reactor dimensions, find the least value of the parameter $\lambda$ for which (3) has a nontrivial solution satisfying the given boundary conditions, or determine the least value of the parameter $\beta$, with $\lambda = 0$, for which system (3) has a nontrivial solution in the region $[0, \beta R]$, satisfying the given boundary conditions (problem of critical reactor dimensions), etc. The method proposed by the authors for solving this problem is a trial method. Given successively the values of the parameter being determined ($\beta$ or $\lambda$), one solves system (3) and each time computes some variable $\Delta$ - "residual" which, roughly speaking, shows how much one boundary condition is not satisfied when the other is satisfied. Trials are made until, for the chosen

ACCESSION NR: AP4037252

value of the parameter, the residual is practically equal to zero. "A great deal of the work in setting up the programs (without which this paper could not have been written) was done by I. F. Sharova." Orig. art. has: 12 formulas.

ASSOCIATION: none

SUBMITTED: 13May63 DATE ACQ: 09Jun64 ENCL: 00

SUB CODE: MA NO REF SOV: 005 OTHER: 000

Card 3/3

L 25620-66 EWT(1)/EEC(k)-2/EWA(h)

ACC NR: AP6015631 SOURCE CODE: UR/0413/66/000/009/0038/0038

INVENTOR: Kovarskiy, B. I.; Godunov, V. I.

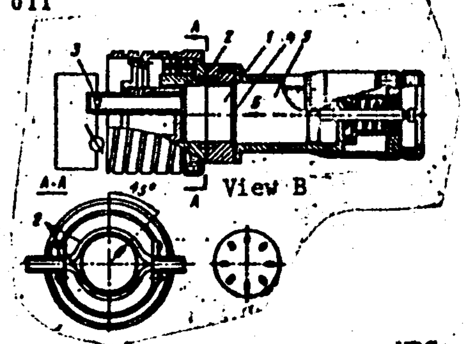
ORG: none

TITLE: Resonance wavemeter for the UHF range. Class 21, No. 181159

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 9, 1966, 38

TOPIC TAGS: waveguide element, waveguide frequency, waveguide transmission

ABSTRACT: The UHF resonance wavemeter shown in the figure consists of a tunable cylindrical $H_{011}$ wave resonator exicted by a waveguide splitter which encloses the




1 - resonator for preliminary tuning; 2 - waveguide splitter; 3 - detector; 4 - coupling diaphragm; 5 - resonator for precise tuning.

Card 1/2 UDC: 621.317.763

APPROVED FOR RELEASE: 09/19/2001 CIA-RDP86-00513R000615520012-9"

L 25620-66

ACC NR: AP6015631

resonator, and a resonance indicator working in conjunction with a detector. High measurement accuracy is achieved by coupling the $H_{011}$ resonator to another cylindrical resonator by means of a transverse diaphragm. The second resonator operates on the $H_{01n}$ wave. Its frequency may be independently tuned. Orig. art. has: 1 figure. [BD]

SUB CODE: 14, 09/ SUBM DATE: 28Sep63/ ATD PRESS: 4265

Card 2/2

GODUNOV, Yuriy Nikolayevich; GRACHEV, Aleksey Gavrilovich, KALASHNIKOV, Anatoliy Fedorovich; KOLESNIKOV, Aleksandr Sergeyevich; DEVOCHKIN, N.I., red.

[The greenbelt; practices in the establishment of park forest plantations and orchards around Volgograd] Zelenoe kol'tso; opyt sozdaniia lesoparkovykh nasazhdenii i sadov vokrug Volgograda. Volgograd, Nizhne-Volzhskoe knizhnoe izd-vo, 1964. 100 p. (MIRA 18:3)

GODUNOVA, G.S.; MIRZOYEVA, I.I. (Leningrad, pereulok Tylenina, d.', kv.54)

Subtrochanteric osteotomy with subsequent skeletal traction in coxa vara in children. Ortop., travm. i protez. 25 no.5:50 My '64. (MIRA 18:4)

1. Iz Detskogo ortopedicheskogo instituta imeni G.I.Turnera (dir. - prof. M.N.Goncharova), Leningrad.

GODUNOVA, G.S., mladshiy nauchnyy sotrudnik (Leningrad, Nevskiy prospekt, d.20, kv.7)

Age-related indications for surgical treatment of congenital syndactyly of the hand. Ortop., travm. i protez. 25 no.8:27-31 Ag '64.
(MIRA 18:4)

1. Iz Detskogo ortopedicheskogo instituta imeni Turnera (dir. - prof. M.N.Goncharova), Leningrad.

GODUNOVA, K. N.

27812. Godunova, K. N. Sort i plodorodiye pochvy (Sortoispytaniye ozimoy i yarovoy pshenitsi). Selektsiya i semenovodstvo, 1949, No. 9, s. 39-43.

SO: Letopis ' Zhurnal'nykh Statey, Vol. 37, 1949

USSR/Soil Science. Tillage. Melioration. Erosion J-5

Abs Jour : Ref Zhur - Biol., No 10, 1958, No 43875

Author : Godunova K.N.
Inst : Not Given
Title : Preliminary Results of a Study of T.S. Mal'tsev's Method of Soil Tilling Made on Variety Testing Plots

Orig Pub : Inform. byul. Gos. komis. po sortoispyt. s.-kh. kul'tur pri M-ve s.-kh. SSSR, 1956, No 4, 3-8

Abstract : A survey of the use of deep non-terraced plowing and surface tillage made in 1955 at 200 variety testing plots and in the kolkhozes of the taiga and steppe zones of the European part of the USSR, Western Siberia, North Kazakhstan and the Northern Caucasus. According to the findings of 9 variety plots in Western Siberia, deep non-terraced plowing on chernozem soils provided an increase in the productivity of summer wheat of from 1 to 2.8 centners per ha. The application of deep non-terraced plowing with an uplifting of the fall plow

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USSR/Soil Science. Tillage. Melioration. Erosion J-5

Abs Jour : Ref Zhur - Biol., No 10, 1958, No 43875

land was advantageous to summer wheat. According to the data of the variety testing plots along the Volga, deep non-terracing plowing in the fall provided an increase in the yield in 4 of the 5 tests. Deep nonterracing plowing of the perennial grass layer lowered the yield from 0.4 to 4.8 centners per ha. The use of multiple disking without plowing the field after the perennial grasses did not show positive results. The summer wheat yield in Moskovskaya Oblast with this tillage was 4.5 centners per ha. lower than by plowing the field with a plow hiaving a colter. The deep non-terraced working of a fallow for winter wheat on podzolic soils had no advantage over ordinary plowing. In the Ukraine and the North Caucasus the use of deep non-terracing after plowed crops also did not increase the harvest. In these rayons positive results were gotten from the surface working of the soil. Deep soil treatment provided a summer wheat, oats and corn yield boost. Positive results were obtained from the application of surface treatment on weed-free land for the

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GODUNOVA, K.N., kand. sel'skokhozyaystvennykh nauk

Contribution of new cultivation practices to production.
Zemledelie 23 no.9:33-41 S '61. (MIRA 14:12)

1. Goskomissiya po sortiosipytaniyu sel'skokhozyaystvennykh kul'tur.
(Agriculture)

GODUNOVA, K.N., kand.sel'skokhozyaystvennykh nauk

Seeding rates and dates for winter wheat in non-Chernozem areas. Zemledelie 24 no.7:27-31 Jl '62. (MIRA 15:12)

1. Gosudarstvennaya komissiya po sortoispytaniyu sel'skokhozyaystvennykh kul'tur.

(Wheat) (Sowing)

GODUNOVA, K.N., kand.sel'skokhozyaystvennykh nauk; KNOPOV, T.V.

Effectiveness of manure-soil composts in the experiments of state variety testing stations. Zemledelie 25 no.2:49-52 F '63. (MIRA 16:5)

(Compost)

KIABUNOVSKIY, Ye.I.; BALANDIN, A.A.; GODUNOVA, L.F.

Chromatographic separation of menthol. Izv. AN SSSR Otd.khim.nauk no.12:2243-2244 D '61. (MIRA 14:11)

1. Institut organicheskoy khimii im. N.D.Zelinskogo AN SSSR.
(Menthol)

KLABUNOVSKIY, Ye.I.; BALANDIN, A.A.; GODUNOVA, L.F.

Inversion of l-menthone. Izv.AN SSSR Otd.khim.nauk no.5:886-890 My '63. (MIRA 16:8)

1. Institut organicheskoy khimii im. N.D.Zelinskogo AN SSSR.
(Menthanone--Optical properties)

BADALOV, S.T.; BASITOVA, S.M.; GODUNOVA, L.I.

Distribution of rhenium in molybdenites in Central Asia.
Geokhimiia no.9:813-817 '62. (MIRA 15:1.)

1. Institute of Geology, Academy of Sciences of the Uzbek Soviet Socialist Republic, Tashkent and Institute of Chemistry, Academy of Sciences of the Tadzhik Soviet Socialist Republic, Dushanbe.

(Soviet Central Asia—Rhenium)
(Soviet Central Asia—Molybdenum ores)

L 23625-65 EWT(m)/EWP(t)/EWP(b) IJP(c) JD/JG/MLK

ACCESSION NR: AT5002793 S/0000/64/000/000/0253/0256

12
B+1

AUTHOR: Basitova, S. M.; Godunova, L. I.

TITLE: Determination of rhenium in sulfides

SOURCE: Vsesoyuznoye soveshchaniye po problemam reniya, 2d, Moscow, 1962. Reniy (Rhenium); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 253-256

TOPIC TAGS: rhenium, rhenium determination, molybdenite analysis, sulfide separation, colorimetry, molybdenum precipitation

ABSTRACT: The authors studies the optimal conditions for the determination of rhenium in sulfide minerals, molybdenites in particular, after the separation of molybdenum by coprecipitation with iron hydroxide. A series of molybdenites with known contents of rhenium were studied. The molybdenite sample was decomposed with nitric acid, the excess of the latter was driven off with formalin, molybdenum was coprecipitated with iron hydroxide by ammonia, the precipitate was centrifuged, and rhenium was determined colorimetrically in the solution as a thiocyanate complex. In addition, the authors developed a technique for determining rhenium in other sulfide minerals such as chalcopyrites, pyrites, sphalerites, etc., the rhenium content of which is much lower. This was done by decomposing the sample with

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L 23625-65

ACCESSION NR: AT5002793

nitric acid, coprecipitating molybdenum with iron hydroxide, and determining rhenium in the solution colorimetrically by means of a catalytic method involving the use of sodium tellurate and stannous chloride. The proposed method is simple and rapid, and permits the determination of rhenium in molybdenites in amounts as low as $10^{-5}$% within ± 20%. It was also used for certain chalcopyrites, where the rhenium content varies between $1.2 \times 10^{-5}$ and $3 \times 10^{-6}$ %. Orig. art. has: 3 tables and 1 formula.

ASSOCIATION: None

SUBMITTED: 05Aug64 ENCL: 00 SUB CODE: IC, GC

NO REF SOV: 012 OTHER: 010

Card 2/2

GODUNOVA, N.K. [Hodunova, N.K.], kand.med.nuak; PRAVDINA, L.I.

Effect of exercise therapy on external breathing in pregnant women and new mothers with cardiovascular diseases. Ped., akush. i gin. 20 no.2:46-50 '58. (MIRA 13:1)

1. Otdel vnutrenney patologii beremennykh (zav. - kand.med.nauk N.A. Panchenko) Ukrainskogo instituta klinicheskoy meditsiny (direktor - prof. A.L. Mikhnev).
(RESPIRATION) (CARDIOVASCULAR SYSTEM--DISEASES)

[illegible]

[illegible] ... 1965. [illegible]

LEVIN, V.I.; GODUNOVA, Ye.K. (Moskva)

Generalization of Carlson's inequality. Mat. sbor. 67 no.4:643-646 Ag '65. (MIRA 18:8)

L 29108-66 EWT(d) IJP(c)

ACC NR: AP6019390 SOURCE CODE: UR/0042/65/C20/006/0066/0067

AUTHOR: Godunova, Ye. K.

ORG: none

TITLE: Integral inequality with an arbitrary convex function

SOURCE: Uspekhi matematicheskikh nauk, v. 20, no. 6, 1965, 66-67

TOPIC TAGS: integration, function

ABSTRACT: One of the inequalities of Hardy

$$\int_0^\infty \left\{ \int_0^\infty e^{-xy} g(y)\, dy \right\}^2 dx < \pi \int_0^\infty g^2(y)\, dy \qquad (1)$$

has the generalization for the case of arbitrary index $p > 1$ and arbitrary nonnegative function $K(xy)$ of the product of two variables ([Note]: N. Dunford and J. Schwartz, Lineynyye operatory (Linear Operators), 1962, page 576):

$$\int_0^\infty \left\{ \int_0^\infty y^{\frac{1}{p}-1} K(xy)\, g(y)\, dy \right\}^p dx < N^p \int_0^\infty g^p(y)\, dy, \qquad (2)$$

where

$$N = \int_0^\infty K(t)\, t^{\frac{1}{p}-1}\, dt.$$

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ACC NR: AP6019390

The present note proves an inequality which is a generalization of the latter: the power function is replaced by a monotone convex function.

Theorem: Let $\varphi(u)$, and $K(u)$, and $f(u)$ be nonnegative functions defined on positive semiaxis $(0; \infty)$: where $\varphi(u)$ is increasing, continuous, and convex; $\varphi(0) = 0$; $K(u)$ and $\frac{\Phi(f(u))}{u}$ belong to $L(0; \infty)$; let $\int K(u)\,du = N$. Then the following exact inequality is valid:

$$\int_0^\infty \frac{1}{x}\varphi\left\{\frac{1}{N}\int_0^\infty xK(xy)f(y)\,dy\right\}dx < \int_0^\infty \frac{\varphi(f(x))}{x}\,dx. \qquad (3)$$

In order to prove inequality (3), it is sufficient to use the property of the convex function

$$\varphi\left\{\frac{\int_0^\infty pf\,dx}{\int_0^\infty p\,dx}\right\} < \int_0^\infty p\varphi(f)\,dx\cdot\frac{1}{\int_0^\infty p\,dx} \qquad (4)$$

and to change the order of integration:

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ACC NR: AP6019390

$$\int_0^\infty \frac{1}{x}\varphi\left\{\frac{1}{N}\int_0^\infty xK(xy)f(y)\,dy\right\}dx < \frac{1}{N}\int_0^\infty\int_0^\infty K(xy)\varphi(f(y))\,dy\,dx =$$

$$= \frac{1}{N}\int_0^\infty \frac{\varphi(f(y))}{y}\int_0^\infty yK(xy)\,dx\,dy = \int_0^\infty \frac{\varphi(f(y))}{y}\,dy.$$

The result is a strict inequality: the sign of equality in (4) is possible only if f(x) = const, which case is ruled out since $\frac{\varphi(f(y))}{y}$ belongs to L (0, ∞).

To prove the exactness of inequality (3), replace f(x) in it with

$$f_\varepsilon(x) = \begin{cases} 1 \text{ for } \varepsilon < x < \frac{1}{\varepsilon}, \\ 0 \text{ for } 0 < x < \varepsilon \text{ or } x > \frac{1}{\varepsilon}, \end{cases}$$

and show that limit A of the ratio of the left-hand side of inequality (4) to the right-hand side, given $\varepsilon \to 0$, is equal to one.

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ACC NR: AP6019390

The author introduces the designation:

$$\frac{1}{N}\int_{\varepsilon}^{\frac{1}{\varepsilon}} xK(xy)\,dy = 1 - \varepsilon(\varepsilon, x), \text{ where } \lim_{\varepsilon\to 0} \varepsilon(\varepsilon, x) = 0,\ \varepsilon(\varepsilon, x) = \varepsilon_1(\varepsilon x) + \varepsilon_2\left(\frac{\varepsilon}{x}\right).$$

since $\lim_{B\to\infty}\int_1^B \frac{h(x)\,dx}{x\ln B} = 0$, if $h(x)\downarrow 0$ for $x\to\infty$, then

$$A = \lim_{\varepsilon\to 0}\frac{\int_{\varepsilon}^{\frac{1}{\varepsilon}} \frac{1}{x}\varphi(1-\varepsilon(\varepsilon, x))\,dx}{\int_{\varepsilon}^{\frac{1}{\varepsilon}} \frac{\varphi(1)}{x}\,dx} > \lim_{\varepsilon\to 0}\frac{\int_{\varepsilon}^{\frac{1}{\varepsilon}} \frac{1}{x}[\varphi(1)-\varphi'(1)\,\varepsilon(\varepsilon, x)]\,dx}{\varphi(1)\int_{\varepsilon}^{\frac{1}{\varepsilon}} \frac{dx}{x}} = 1.$$

Since $A \leqslant 1$, by virtue of inequality (3), $A = 1$.
In the proven inequality the author puts $\varphi(u) = u^p$, where $p > 1$, $K(u) = u^{\frac{1}{p}-1}K_1(u)$, $f(y) = y^{\frac{1}{p}}g(y)$, and obtains inequality (2). The latter, given $p = 2$ and $K_1(xy) = e^{-xy}$, becomes Hardy inequality (1). Orig. art. has: 4 formulas. [JPRS]

SUB CODE: 12 / SUBM DATE: 01Jul64 / ORIG REF: 001

Card 4/4

GODVINSKIY, M.I.

Comments on a review of B.A.Bykov's "Geobotany" in a Parsian journal. Vest.AN Kazakh.SSR 16 no.6:87 Je '60. (MIRA 13:7)
(Phytogeography) (Bykov, B.A.)

GODVINSKIY, M.I.

New species of the genus Calligonum L. from Kazakhstan. Trudy Inst. bot. AN Kazakh. SSR 11:178-202 '61. (MIRA 15:3)
(Kazakhstan--Calligonum)

GODVINSKIY, M.I.

Materials on ephemeral vegetation in the eastern Kyzyl Kum.
Trudy Inst. bot. AN Kazakh. SSR 13:133-162 '62. (MIRA 15:12)
(Kyzyl Kum--Desert flora)

GODWOD, J.

GODWOD, J. Crossing of overhead channels reserved for carrier telephony. Pt. 3, p. 372.

Vol. 8, no. 12, Dec. 1956
PRZEGLAD KOLEJOWY ELEKTROTECHNICZNY
PHILOSOPHY & RELIGION
Warszawa, Poland

SO: East European Accession, Vol. 6, No. 3, March 1957

GODWOD, J.

The present state and the expected development of the railroad communication system in Poland, p. 93.

PREZEGLAD KOLEJOWYI (Wydawnictwa Komunikacyjne) Warszawa, Poland. Vol. 11, no. 3, Mar. 1959

Monthly list of East European Accessions Index, (EEAI) LC, VOL. 8, no. 66 June, 1959.
uncla.

GODWOD, J.

The economic problem of railroad telecommunication. p. 147.

PRZEGLAD KOLEJOWY ELEKTROTECHNICZNY. (Wydawnictwa Komunikacyjne) Warszawa, Poland, Vol. 11, no. 5, May 1959.

Monthly list of East European Accessions (EEAI) LC, Vol. 9, no. 1, Jan. 1960.

Uncl.

GODWOD, Jerzy, mgr inz.

Application of coaxial cables in the railway telecommunication network. Przegl kolej elektrotech 13 no.6:181-184 Je '61.

GODWOD, Jerzy, mgr inz.

A new megaphone system for passenger cars proposed by the International Railroads Union (UIC). Przegl kolej elektrotech 14 no.3:77-80 Mr '62.

GODWOD, Jerzy, mgr inz.

New trends in the design and construction of transistor repeaters of carrier telephony. Przegl kolej elektrotech 13 no.1:29-31 Ja '61.

BELLERT, Stanislaw; GODWOD, Jerzy; KOWALSKI, Mieczyslaw

Teleconference equipment. Rozpr elektrotech 8 no.2:317-335 '62.

1. Katedra Teletransmisji Przewodowej, Politechnika, Warszawa.

GODWOD, Jerzy, mgr inz.

Analysis of economic effects of telecommunication installations.
Przegl kolej elektrotech 15 no. 8: 226-230 Ag '63.

GODWOD, Jerzy, mgr inz.

Modernization of the telegraphic network brings about new possibilities of services. Przegl kolej elektrotech 11 [i.e. 16] no.2:46-50 F '64.

GODWOD, Jerzy, mgr inz.

Possibilities of realizing telegraphic connections in the communication network of the railways. Przegl kolej elektrotech 11 [i.e. 16] no.3:80-83 Mr '64.

POLAND/Electricity - Conductors G-3

Abs Jour : Ref Zhur - Fizika, No 3, 1958, No 6238

Author : Auleytner J., Godwood, K., Krilov J.
Inst : Institute of Mathematics, Polish Academy of Sciences
Title : Observations of Etching of Germanium Crystals

Orig Pub : Bull. Acad. polon. sci., 1957, Cl. 3, 5, No 6, 639-642

Abstract : An investigation was made of the structure of germanium crystals as a function of the method of grinding, duration and velocity of etching in CP-4. The observations were carried out with the aid of a metallographic microscope. The orientation of the crystalline blocks was determined by the Laue method using sharp-focusing X-ray tubes with a focus on the order of 25 microns. This made it possible to determine the orientation of very small regions. The surfaces of the crystals, ground with coarse carborundum $0.075 \leq d \leq 0.095$ mm and etched for two hours in CP-4 have displayed a block structure independently of their orientation. In the case $d < 0.075$ mm, the block structure vanishes on certain surfaces, but conical figures appear instead. A more prolonged etching leads to a

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POLAND/Electricity - Conductors

Abs Jour : Ref Zhur - Fizika, No 3, 1958, No 6238

sharpening of the conical figures and to the observation of dislocation boundaries. At very prolonged etching a micro-block structure appears on certain surfaces. The duration of the process of disappearance of the block structure depends on the orientation and on the duration of the etching.

Card : 2/2

GODWOOD, S.

**Purification of diffusion- and pulp-press waters by liming and carbonatation for re-utilisation. Influence of returned water on work of diffusion.** T. Pietrzykowski, A. Kintzel, and S. Godwood [illegible] (*Prace Glownego Inst. Przemyslu Rolnego i Spozywczego,* [illegible] 1—9).—Water re-utilisation at Chybie factory during ten days at the end of season are described. Pulp-press water was strained, defecated with 0·1—0·4% of lime (on wt. of water), carbonatated, filtered in presses, mixed with diffusion water, which had been filtered separately, and returned to the battery. For optimum filtration 0·3% of lime was best. Results indicated no difference with cold (50°) and hot (70—90°) carbonatation, if filtration was carried out at 70°. Removal of non-sugars was 65—88%. Analytical data from the battery operation and for subsequent processing stages are given. Sugar losses in diffusion were reduced by 0·13%, and might be better with greater pressing of the pulp), but draw-off had to be increased, reducing juice Brix by 1—2°, and increasing steam consumption and reducing throughput. Juice and ultimate sugar qualities were not affected. SUG. IND. ABSTR. (J. M. J.)

GODWOD, STanisLaw

Influence of returning water from the diffusion and from the
pulp press on the operating process in the sugar factory. Ta-
deusz Pietrzykowski, Stanislaw Godwod, and Zbigniew
Zaręba. Prace Glównego Inst. Przemyslu Rolnego i Spożyw-
czego 4, No. 4, 1-14(1954)(French summary).—If recycling is
applied, the time cycle is extended and the discharge of
juice from diffusors becomes more difficult. Purity and d.
of the juice from diffusors remain practically unchanged.
However, the amt. of colloidal substances extd. by the re-
cycled wash water increases. The sugar color increases and
the ash content drops slightly, but the quality of molasses
remains unaffected. Advantages of recycling are: de-
crease of sugar losses by about 0.1% and saving of the water
requirements up to 160-170%. Studies of defibration of the
waters by means of decantation indicate that decantors work
satisfactorily.

Adam J. Pilko

CH

(1)

POLAND/Chemical Technology - Chemical Products and Their Application, Part 3. - Hydrocarbons and Their Treatment. H-25

Abs Jour : Ref Zhur - Khimiya, No 7, 1958, 22949

Author : Stanislaw Godwod, Zbigniew Zareba, Janusz Haszczynski
Inst : "
Title : From Studies of Methods of Milk-of-Lime Purification.

Orig Pub : Gaz. cukrown., 1956, 58, No 12, 310-312

Abstract : The methods applied to the purification of milk of lime (ML) are discussed. The results of milk of lime purification at two plants using vibrators (V) and two other plants using decantators (D) are compared. It is found that the V-s yield better results and occupy less space than the D; a disadvantage of the V-s is a rapid wear of screens, the serviceability of which is about 2 weeks in the average. The purification result depends on the closeness of sieves. It is suggested to treat ML in V-s

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POLAND/Chemical Technology, Chemical Products and Their Application, Part 3. - Carbohydrates and Their Treatment. H-26

Abs Jour: Referat. Zhurnal Khimiya, No 10, 1958, 34093.

Author : Tadeusz Pietrzykowski, Stanislaw Godwod, Zbigniew Zareba.
Inst : not given
Title : Return of Diffusion Water to Diffusion Battery for Repeated Utilization.

Orig Pub: Gaz. cukrown., 1957, 59, No 6, 157-162.

Abstract: The work of a sugar factory with repeated utilization of diffusion water (DW), as well as of water from presses (PW), was studied in 1955. The work technology is described, the complete water economy balance is given,

Card : 1/2

GODWOD, Stanislaw; PIETRZYKOWSKI, Tadeusz

Chlorination of barometric water cooled in flow through basins of the Michalow sugar plants. Prace Instyt i Lab Bad Przem Spoz 11 no.4:1-13 '61.

1. Instytut Przemyslu Cukrowniczego, Pracownia Gospodarki Wodnej, Warszawa

L 64323-65 EWT(1)/EWA(j)/EWT(m)/EWA(b)-2 RW/RO/RM
ACCESSION NR: AP5022929 UR/0062/65/000/008/1370/1375
661.718.1

AUTHOR: Rozengart, Ye. V.; Godyna, Ye. I.; Godovikov, N. N.

TITLE: Anticholinesterase properties of some O-ethyl S-alkyl methylthiophosphonates. 2. Kinetics of inhibition of cholinesterase and acetylcholinesterase by O-ethyl S-n-alkyl methylthiophosphonates

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 8, 1965, 1370-1375

TOPIC TAGS: nerve gas, chemical warfare agent, cholinesterase inhibitor, anticholinesterase activity, thiophosphate ester

ABSTRACT: The kinetics of inhibition of equine blood-serum cholinesterase and bovine erythrocyte acetylcholinesterase by a series of O-ethyl S-n-alkyl methylthiophosphonates were studied. The n-alkyl ranged from $C_2$ to $C_{10}$. The rate constants of alkaline hydrolysis of the above esters were determined. It was found that the inhibiting action of the esters increases with increasing alkyl size, up to $C_6$ for cholinesterase and up to $C_8$ for acetylcholinesterase. A further increase in alkyl size does not bring about any increase in inhibition. Alkaline hydrolysis rate constants for all compounds were found to be nearly identical. The authors suggest that variations in

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ACCESSION NR: AP5022929

anticholinesterase activity among the above esters are determined mainly by steric factors, rather than by electron-density aspects, i.e., phosphorylating ability. The inhibition mechanism is discussed. The kinetic data and the physical constants of the esters are given in tabular form. Orig. art. has: 2 figures and 4 tables. [VS]

ASSOCIATION: Institut evolyutsionnoy fiziologii im. I. M. Sechenova Akademii nauk SSSR (Institute of Evolutionary Physiology, Academy of Sciences, SSSR); Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Heteroorganic Compounds, Academy of Sciences, SSSR)

SUBMITTED: 22Nov63    ENCL: 00    SUB CODE: CB, OC

NO REF SOV: 006    OTHER: 003    ATD PRESS: 4083

Card 2/2

GODYATSKIY, V.Ye.

Analysis of weak bases by the high-frequency method. Izv.vys.ucheb. zav.;khim.i khim.tekh. 6 no.4:562-566 '63. (MIRA 17:2)

1. Pyatigorskiy farmatsevticheskiy institut. Kafedra farmatsevticheskoy khimii.

GORYATSKIY, V.Ye.; BERNSHTEYN, V.N.

Use of the refractometric and high frequency methods for the express analysis of some medicinal forms. Apt. delo 13 no.1: 39-42 Ja-F '64. (MIRA 17:4)

1. Pyatigorskiy farmatsevticheskiy institut.

KUTSIY, Yu., Geroy Sotsialisticheskogo Truda; TIMOFEYEV, M.; KHABAROV, N., Geroy Sotsialisticheskogo Truda Godyayev, A., deputat Verkhovnogo Soveta SSSR, tokar'

Toward new creative achievements. Sov. profsoiuzy 17 no.1:8-11 Ja '61. (MIRA 14:1)

1. Rukovoditel' brigady kommunisticheskogo truda Kiyevskogo zavoda "Krasnyy ekskavator" (for Kutsiy). 2. Chlen komiteta profsoyuza zavoda imeni Vladimira Il'icha (for Timofeyev). 3. Brigadir kompleksnoy brigady stroiteley Stroitel'no-montazhnogo uchastka No. 2 Kuybyshevskogo tresta "Metallurgstroy" (for Khabarov). 4. Sudomekhanicheskiy tsekh zavoda "Krasnoye Sormovo" (for Godyayev).

(Russia—Economic donditions)

GODYAYEV, A., tokar'

Guards of the builders of communism. Sov. profsoiuzy 19 no.10:
1-2 My '63. (MIRA 16:7)

1. Zavod "Krasnoye Sormovo", g.Gor'kiy.
(Socialist competition)
(Machinery industry--Technological innovations)

GODYAYEV, Yu.L., inzhener.

Determining the purity of oxygen obtained by electrolysis.
Masl.-zhir.prom. 21 no.1:29-30 '56. (MIRA 9:6)

1.L'vovskiy zhirkombinat.
(Chemical apparatus) (Oxygen)

GODYAYEV, Yu.L., inzh.

Volumetric determining of nickel in the preparation of catalysts.
Masl.-zhir.prom. 28 no.12:13-14 D '62. (MIRA 16:1)
(Nickel catalysts—Analysis)

MARCINIAK, Witold; GODYCKA, Iwona; WOZNY, Wojciech

Value of electrostasis as a factor accelerating union of bone fractures. Chir. narz. ruchu ortop. polska 26 no.6:713-717 '61.

1. Z Kliniki Ortopedycznej AM w Poznaniu Kierownik: prof. dr W. Dega.
(FRACTURES UNUNITED ther) (IONTOPHORESIS)
(CALCIUM ther)

GODYCKA, Iwona

Analysis of causes of traumatic amputations and their social consequences. Chir. narzad. ruchu ortop. Pol. 29 no.3:347-352 '64.

1. Z Kliniki Ortopedycznej Akademii Medycznej w Poznaniu (Kierownik: prof. dr. med. W. Dega).

GODYCKI, J. : DEMUS, Z.

Some Problems Concerning the Research on Type It Sealing Materials, p. 267.

PRZEGLAD MECHANICZNY (Stowarzyszenie Inzynierow i Technikow Mechanikow Polskich)
Warszawa, Poland
Vol. 18, no. 9, May 1959.

Monthly List of East European Accessions Index (EEAI), LC, Vol. 8, No. 11, November 1959
Uncl.

GODYCKI, Michal (Poznan, ul. Slowackiego 38)

Anthropobiometric problems at a school medical center and in work of a school physician. Polski tygod. lek. 9 no.38:1237-1240 20 Sept 54.

(ANTHROPOMETRY,
in school med. serv.)
(SCHOOLS,
med. serv., anthropometry in)

GODYCKI, Michal

Anthropology in the Five Year Plan 1961-1965 of scientific research.
Kosmos biol 10 no.5:509-513 '61.

(Poland--Anthropology)

GODYCKI-CWIRKO, T.

Ultimate stretching of reinforced concrete, p. 232.

INZNIERIA I BUDOWNICTO. (Naczelna Organizacja Techniczna i Polski Zwiazek Inzynierow i Technikow Budowlanych) Warszawa, Poland, Vol 16, No. 6, June 1959

Monthly List of East European Accessions Index (EEAI), LC, Vol. 8, No. 11, November 1959
Uncl.

GODYCKI-CWIRKO, Tadeusz

Remarks on shearing in reinforced concrete. Budown ladowe no.4:131-153 '61.

1. Katedra Budownictwa Zelbetowego, Politechnika, Gdansk.