"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

L 11083-65
ACCESSION NR: AP4046633

2

the current was made to flow along the directions [111], [100], and [110]. The test procedure was described in an earlier paper by two of the authors (Baranskiy and Kurilo, FTT v. 6, 54, 1964). The tests were made in intermediate magnetic fields ($\mu H/c \approx 1$). The impurity scattering was produced by antimony with a concentration 3.2×10^{15} cm^{-3}. The results show that even a small contribution of impurity scattering reduces noticeably the value of $\Delta R/R(0)$ compared with the case of pure lattice scattering. Furthermore, in the case when the current was parallel to the [110] direction the impurity scattering (at small angles between the current and the field) leads even to a reversal of the sign of $\Delta R/R(0)$. This indicates that the concentration interval of samples intended for use in applications where R is supposed to be independent of the field, can be expanded appreciably by suitable choice of the angle between the field and the current. "The authors are deeply grateful to Professor A. G. Samoylovich and Doctor of Physical Mathematical Sciences Ye. G. Minelyuk for a fruitful discussion of the results of the work, and

Card 2/3

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

L 11083-65
ACCESSION NR: AP4046633

also for useful advice." Orig. art. has: 2 figures.

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiev (Institute of Semiconductors AN UkrSSR)

SUBMITTED: 18May64

ENCL: 00

SUB CODE: SS, EM

NR REF SOV: 008

OTHER: 001

Card 3/3

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSKIY, P.I. [Baranskyi, P.I.]; [illegible]

Electrophysical properties and structure of dislocation-free germanium crystals. Ukr. fiz. zhur. 9 no.9:956-961 S '64. (MIRA 17:12)

1. Institut poluprovodnikov AN [illegible], Kiyev.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

L 3575-66 EWT(1)/EWT(m)/EWP(w)/T/EWP(t)/EWP(b)/EWA(h)/EWA(c) IJP(c) JD/AT

ACCESSION NR: AP5024814 UR/0032/65/031/010/1207/1209

620.179.1

37
34
B

AUTHOR: Baranskiy, P. I.; Levinzon, D. I.; Shapoval, V. Ya.

55 44 55 44 55 44

TITLE: Use of the four-probe method for measuring the resistivity of heavily doped germanium

SOURCE: Zavodskaya laboratoriya, v. 31, no. 10, 1965, 1207-1209

TOPIC TAGS: germanium single crystal, resistivity, germanium semiconductor

55,27 18 21,44,55 18

ABSTRACT: While the four-probe method has been ineffective for measuring resistivity in heavily doped germanium, this approach has several advantages for this type of measurement. The purpose of this paper is to study the nature of the obstacles which prohibit the use of this method in the case of heavily doped germanium, and to suggest measures for modernizing the method. Germanium single crystals doped with As, Ga and Sb were studied. The resistivity of the germanium with Ga and Sb was $\sim 3\text{-}4 \cdot 10^{-3}$, and with As $5\text{-}9 \cdot 10^{-4}$ $\Omega \cdot$cm. The two-probe method showed a variation of less than 0.5-1% in resistivity for a length of 1-2 cm. Tungsten and phosphor bronze probes were used. Interprobe distances were from 0.70 to 1.30 mm. It is

Card 1/2

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L 3575-66

ACCESSION NR: AP5024814

3

found that the spurious phenomena which limit the applicability of the four-probe method in the case of heavily doped germanium are thermoelectric effects caused by temperature gradients which are the result of gradients in the current density and the physical inadequacy of the contacts. It is recommended that the electrical forming method be used for making the contacts. Contact formation with a 500-600 ma current of 1-2 seconds gave probes which yielded values of ρ within 7% of control data for the two-probe method. Orig. art. has: 3 figures, 4 formulas.

ASSOCIATION: Institut poluprovodnikov Akademii nauk UkrSSR (Institute of Semiconductors, Academy of Sciences, UkrSSR)

SUBMITTED: 00 ENCL: 00 SUB CODE: SS, NP

NO REF SOV: 001 OTHER: 001

Card 2/2

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSKI, Roman, doc.; WALCZUK, Eugeniusz, mgr inz.

Contact capacity of switchgear in networks limited by contact welding. Przegl elektrotechn 40 no.1:8-17 Ja'64.

Mechanical strength tests of electric contact weldings. Ibid.:48-50

1. Katedra Aparatow Elektrycznych, Politechnika, Lodz.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSKIY, S. M.

27770. BARANSKIY, S. M. , SERGEYEV, G. K., i SMIRNOV, A. V.--proizvodstvo stroitel'nogo kirpicha iz vakuumirovannoy glinyanoy massy. mest. stroit. Materialy, 1948, vyp. 10, S. 1-9.

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

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

L 24656-65 EWT(m)/T/EWP(t)/EWP(b) IJP(c)/AFWL/BSD/SSD/ASD(a)-5/ESD(gs)/ESD(t) JD

ACCESSION NR: AP4048660 S/0185/64/009/009/0956/0961

23
21
B

AUTHOR: Barans'ky*y, P. I.; Vasy*levs'ks, V. M.

TITLE: Investigation of the electrophysical properties and structures of dislocation free germanium crystals

SOURCE: Ukrayins'ky*y fizy*chny*y zhurnal, v. 9, no. 9, 1964, 956-961

TOPIC TAGS: germanium, semiconductor, dislocation free germanium, low temperature annealing, germanium crystal, dislocation density, current carrier concentration, vacancy

ABSTRACT: Comparative experiments were conducted to elucidate the effect of low temperature annealing on n-type germanium crystals containing antimony as an impurity and differing greatly in dislocation density. The annealing noticeably decreased the concentration of the current carriers n_e in the dislocation-free n-germanium samples, but had little effect on the current carrier concentration in the samples with $N_D \approx 5 \cdot 10^3$ cm^{-2}. It was proposed that this decrease in cur-

Card 1/2

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ACCESSION NR: AP4046660

2

rent carrier concentration resulting from low-temperature annealing of typical dislocation-free crystals is characteristic of such material and is caused by the higher density of vacancies in comparison to crystals with dislocations. The assumption that the vacancies, and not the change in the electrical activity of the impurity atoms, were connected with the decrease of n_e was supported by the following factors: (1) low temperature annealing reduced typical thermal acceptors to the passive state, which would have increased and not decreased n_e in the conductance zone. (2) Formation of GeO_4 -type associated complexes with oxygen must be accompanied by the appearance of additional donor centers which would also increase and not decrease n_e. (3) It was impossible to change the observed decrease in n_e by diffusion of copper (acceptors) into the bulk of the crystals by the annealing process. "The authors thank O. G. Miselyuk for attention to the work and discussion of the results." Orig. art. has: 5 figures.

ASSOCIATION: Institut napivprovidnikiv AN URSR m. Kiyiv (Institute of Semiconductors AN URSR)

SUBMITTED: 30Dec63 ENCL: 00

SUB CODE: SS NO REF SOV: 001 OTHER: 007

Card 2/3

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY, JOB, Imre

The Applications of Light Metals in Vehicles. Imre Baranszky-Jób (*Aluminium* (*Budapest*), 1919, 1, [illegible] 281).—[In Hungarian]. A comprehensive survey. Weight reduction by using light alloys, and economic considerations arising out of this, are discussed. The possibility of solving special problems in the field of transport, by using light metals is discussed. 42 ref.—I. S. M.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, I.

24

625.622.85

40. Possibilities of reducing the weight of tramway cars, by I. Baránszky Job ("Gép" — *Machinery* — Vol. II, No 11, pp 29-39, Nov., 1950, 12 refs., 4 tabs).

A municipal transportation system may be called good when it is rapid, comfortable, inexpensive and safe. Two factors which have bearing on increasing the speed, namely, acceleration and slowing down, may best be furthered by a reduction of the specific unloaden weight of the vehicle. Three standard types of tramway cars are described. The American (*PCC*), [illegible] and standard type [illegible] in the Soviet Union providing [illegible] types of cars suited to the specific requirements of the different towns. These latter are designed for one-way traffic which allows for a considerable reduction of expensive and heavy-weight parts. A table shows that the specific gravity of a car increases in proportion to the reduction of its floor space, consequently, it is practical to design large capacity vehicles. Some weight reducing factors are: the use of hollow axles, rubber springing, light metal parts (for disk wheel centers, axle boxes), and synthetic materials (for brakeshoes), etc. As a consequence of these measures the load on the traction motor decreases, and as a further result a considerable savings may be obtained in the weight of the motor and in energy consumption.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

March 1953
Non Ferrous
Metallurgy

Experiments on aluminium railway wheel centres with regard to cold shrink fitting. T. Baranszky-Jób (*Aluminium, Budapest*, 1951, 8, No. 9, 194—203; *Metal Abstr.*, 1951, 20, 304).—Advantages resulting from the use of wheel centres made of Al with steel tyres include the reduction of track wear due to the lower weight. Experimental wheel centres made of heat-treated Al alloys were fitted with steel tyres by both hot and cold shrink fitting, and mounted on the axles by cold pressing. Stresses resulting from these operations were determined. Due to the lower modulus of elasticity of Al, the wheel centres developed greater stresses than did either the tyres or axles, but the joints were dependable and strong. Four Al wheel centres are being tested in service by the Budapest Tramways.

R. B. CLARKE.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, I.
industrial uses & applications

2

*Light Metal [Aluminium Alloy] Tramcar Wheel-Centres, and Low-Temperature Investigations Connected Therewith. I. Baránszky-Jób (*Acta Tech. Acad. Sci. Hungar.*, 1952, 5, [illegible] English). The construction and fitting of tramcar wheel-centres, made of a heat-treated, forge-pressed Al alloy, contg. approx. Cu 1·8, Fe 1·45, Si, 0·77, Mg 0·86, Mn 0·038, Ni 1·22, and Ti 0·1-0·2%, with a U.T.S. of ~28·5 tons/in.², are discussed. The wheels were fitted to the centres partly by the usual process of setting up when heated, and partly by a low-temp. process, effected by liq. air, in which the centre was cooled to ~ − 130° C. and pressed into the wheel. Details of the low-temp. assembly process, and of tests applied to determine the effects of low temp. upon the Al alloy, are given. Because of the low elastic modulus of the alloy, the centre is principally affected by the elastic deformation resulting from shrinkage, and thus produces smaller stresses in wheel and axle than when cast-steel centres are used, and relieves the stress on the axle. The fit is safe and strong. Four wheel centres of Al alloy are now in trial service on the Budapest tramways. 20 ref.

—J. S. G. T.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, I. - Vol. 1, no. 6, June 1954. (Jarmuvek es Gepek)

Basic principles in reducing the weight of vehicles. p. 173.

SO: Monthly list of East European Accessions, (EEAL), LC, Vol. 4, No. 9, Sept. 1955
Uncl.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSKY-JOB, I.

The first light metal railroad car is under construction in Hungary.

P. 514. (KOHASZATI LAPOK.) (Budapest, Hungary) Vol. 12, No. 11/12, Nov./Dec. 1957

SO: Monthly Index of East European Accession (EEAI) LC. Vol. 7, No. 5, 1958

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre

Periodical reviews of the Section of Rolling Stock.
Jarmu mezo gep 7 no.11:438-439 '60.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre

Which are the principal characteristics of a design engineer? Jarmu mezo gep 8 no.12:473-474 D '61.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-Job, Imre

Railroad vehicles; new Japanese motor cars. Jarmu mezo gep 9 no.2:79 F '62.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY JOB, Imre

Railroad cars, vehicles. Jarmu mezo gep 8 no.1:38 Ja '61.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre

Development of the economy of aluminum railway vehicles on the ground of the current producer's prices. Koh lap 93 no.2:83-90 F '60.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre

Some remarks about the manufacture and economy of aluminum railroad vehicles. Koh lap 93 no.10:469-472 O '60.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre

Railroad vehicles. Jarmu mozo gep 8 no.8:311 Ag '61.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

SZABO, Dezso, dr.; CSANADI, Gyorgy, dr.; SARLOS, Istvan; KADAS, Kalman, dr., kandidatus; GYULAI, Geza; VILMOS, Endre, dr.; NAGY, Rudolf, fopernok KOLLER, Sandor, adjunktus; TURANYI, Istvan, dr., tanszekvezeto egyetemi tanar; BENYEI, Andras, dr.; BARANSZKY JOB, Imre; BORSOS, Jozsef, dr., egyetemi tanar; HEGYI, Kalman

The 5th Conference on City Transportation. Epites kozleked tud kozl 7 no.3:341-346 '63.

1. Committee of Highway and City Transportation, Hungarian Academy of Sciences, Budapest (for Csanadi). 2. Executive Commission, Capital City Council, Budapest (for Sarlos). 3. Faculty of Transportation Engineering, Technical University of Building and Transportation, Budapest (for Kadas).4. Head, Directorate of Transportation, Executive Commission, Capital City Council, Budapest (for Gyulai). 5. Technical University of Building and Transportation, Budapest (for Vilmos and Turanyi). 6. Directorate of Transportation, Executive Commission, Capital City Council, Budapest (for Rudolf Nagy). 7. Chair of Road Construction, Technical University of Building and Transportation, Budapest (for Koller). 8. Research Group of Transportation, Hungarian Academy of Sciences, Budapest (for Benyei). 9. National Committee on Technical Development, Budapest (for Baranszky Job). 10. Road and Railroad Planning Enterprise, Budapest (for Hegyi).

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

MARANSZKY-JOb, Imre

An account of the 4th International Conference on Welding in Leipzig. Gep 16 no. 3:117-118 Mr '64.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre, dipl. ing. (Budapest)

Aluminum alloys in the construction of railway rolling stock.
Przegl spaw 16 no.7/8:179-182 Jl-Ag'64

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre

Hungarian-manufactured railroad passenger cars with aluminum construction. Jarmu mezo gep 8 no.5:169-182 My '61.

1. Wilhelm Pieck Vagon - es Gepgyar fokonstruktore, Gyor.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre

Electrical spot welding in vehicle construction. Jarmu mezo gep 9no.4: 123-132 Ap '63

1. Fokonstruktor, Wilhelm Piech Vagon-es Gepgyar, Gyor.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre

Railroad vehicles. Jarmu mezo gep 8 no.4:155 Ap '61.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre; EKKER, Antal; MOCSKONYI, Miklos

Four-axle motorcoach with aluminum construction of the Budapest Electric Railways. Jarmu mezo gep 6 no. 9:277-288 '59.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre

"Aluminum technology and the railway rolling stock" by K .P. Brockway. Reviewed by Imre Baranszky-Job. Jarmu mezo gep 7 no.8:287-290 '60.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY JOB, Imre

Analysis of the economy of aluminum rail vehicles as reflected in the new system of producer's prices. Jarmu mezo gep 7 no.9: 321-327 '60.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre, fokonstruktor

Some current questions relationg to the weight reduction in designing railroad passenger cars. Jarmu mezo gep 7 no.10: 361-371 '60.

1. Wilhelm Pieck Vagon- es Gepgyar, Gyor.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre

Railroad vehicles. Jarmu mezo gep 10 no.5:191 My '63.

The London subway is one hundred years old. 191.

Miklos Mocskonyi, 1905-1963; obituary. 192.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre

The first Hungarian-manufactured light metal rail car. Koh lap 12 no. 11/12 514-516 N-D '57.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY-JOB, Imre, okleveles gepeszmernok, fokonstruktor

The first underground railway of the world is one hundred years old. Kozl tud sz 13 no.9:426-427 S '63.

1. Wilhelm Pieck Vagon- es Gepgyar.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANSZKY JOB, Imre, nyugalmazott, fokonstruktor

Newer technical and economic aspects on the design and manufacture of aluminum railway vehicles. Koh lap 96 no.11: 504-510 N'63.

1. Wilhelm Pieck Vagon - es Gepyar, Gyor.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANTSEV, A.A.

CA

Viscometer. A. A. Barantsev. U.S.S.R. 68,446.
May 31, 1947. M 11

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARAMTSEV, B.G.

Propagation of singularities of hyperbolic-equations in a band with reflection from irregular boundaries. Nauch.dokl.vys.shkoly; fiz.-mat.nauki no.5:10-18 '58. (MIRA 12:7)

1. Leningradskiy gosudarstvennyy universitet im. A.A. Zhdanova.
(Differential equations, Partial)

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BASHLAY, K., inzh.; BARANTSEV, I., inzh.; PUSHESHNIKOV, P., inzh.

Using simplified technological methods in making expanded clay fillers. Stroi. mat. 4 no.4:4-7 Ap '58. (MIRA 11:5)
(Clay)

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

S/170/63/006/001/014/015
B108/B186

AUTHORS: Neshpor, V. S., Barantseva, I. G.

TITLE: Investigation of the heat conductivity of the molybdenum silicides

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 6, no. 1, 1963, 109-113

TEXT: To improve and amplify the published data, the authors measured the heat conductivities of Mo_3Si, Mo_5Si_3, and $MoSi_2$ at room temperature. The measurements were made under steady-state conditions. The small, pressed cylindrical samples of 6-8 mm diameter and 10-12 mm height, heated by a copper cylinder, contained two 1.5-mm bores with thermocouples to measure the temperature gradient. Heat losses from the sample were reduced by an asbestos insulation. The heat conduction due to free carriers and the lattice heat conduction were calculated. The latter amounts to about half the total heat conductivity and depends greatly on the type of crystallization. This indicates that the interatomic bonds possess an essential covalent component. After introducing a correction

Card 1/2

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for the porosity of the samples the following results were obtained: Mo_3Si 95.0 $cal.cm^{-1}sec^{-1}deg^{-1}$; Mo_5Si_3 52.0 $cal.cm^{-1}sec^{-1}deg^{-1}$; $MoSi_2$ 116.5 $cal.cm^{-1}sec^{-1}deg^{-1}$. There are 1 figure and 2 tables.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN USSR, g. Kiyev (Institute of Powder Metallurgy and Special Alloys AS UkrSSR, Kiyev)

SUBMITTED: April 28, 1962

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

VASIL'YEV, L. (g. Tyumen'); CHICHKO (g. Kiyev); STARODUB, D. (g. Kiyev); KALUZHSKIY, G. (g. L'vov); SMIRNOV, V.; BEBENIN, A.; ORLOV, I.; FERUK, V. (Kuybyshev); BYCHININ, I. (Kuybyshev); BASHKO, V.; SHEVKUN, Yu. (Khar'kov); ISTYUFEYEV, V. (Leningrad); GATSANYUK, P. (Chernigovskaya obl.); SKURKO, L.; BABYUK, M.; GURANOV, L. (Krasnodar); TISHCHENKO, D. (st. V. Sadovaya); YEFIMOV, M.S. (Leningrad); FEDOROV, V.; SUKHOV, A.; TIMOSHENKO, I. (Omskaya oblast'); KRIVTSUN, B. (Khar'kov); BARANTSEV, N. (Fedosiya).

Exchange of experience. Radio no.1:31,32,35,39,40. Ja '59.. (MIRA 12:3)

(Radio)

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANTSEV, R.G.

Calcualtion of the beginning of the superzonical part of the flat Laval's nozzle with a straight sound line. Vest.Len.un. 11 no.19:133-149 '56. (MLRA 10:1)

(Aerodynamics, Supersonic)

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANTSEV, R. G., Cand of Phys-Math Sci -- (diss) "Exact solutions of regional problems for Chaplygin type equations." Leningrad, 1957, 9 pp (Leningrad State University) 100 copies (KL, 35-57, 105)

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANTSEV, R.G.

BARANTSEV, R.G.

Exact calculation of the supersonic part of a flat nozzle [with summary in English]. Vest. LGU 12 no.13:89-92 '57. (MIRA 10:11)
(Supersonic nozzles)

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

20-5-2/67

AUTHOR BARANTSEV R.G.

TITLE The Boundary Value Problem For the Equation $\Psi_{\sigma\sigma}-K(\sigma)\Psi_{\theta\theta}=0$ with Data On the Characteristic And On the Straight σ=const. (Krayevaya zadacha dlya uraveneniya $\Psi_{\sigma\sigma}-K(\sigma)\Psi_{\theta\theta}=0$ s dannymi na kharakteristike i pryamykh σ=const.-Russian)

PERIODICAL Doklady Akademii Nauk SSSR,1957,Vol 113,Nr 5,pp 955-958(U.S.S.R.)
Received 6/1957 Reviewed 7/1957

ABSTRACT The present equation investigates the equation: $L(\Psi)=\Psi_{\sigma\sigma}-K(\sigma)\Psi_{\theta\theta}=0, K(\sigma)\in C$ within the hyperbolic stripe $(K(\sigma)>0)$. AB here denote the section of the characteristic of any family with the ends at the points (σ_0,θ_0) and (σ_1,θ_1). Here the author determines and investigates the solution of the boundary value problem $L(\Psi)=0;\ \Psi|_{AB}=\overline{\Psi}(\sigma);\ \Psi|_{\sigma=\sigma_0}=\overline{\Psi}(\sigma_0);\ \Psi|_{\sigma=\sigma_1}=\overline{\Psi}(\sigma_1)$ in the stripe $S\{\sigma_0\leqslant\sigma\leqslant\sigma_1;\ -\infty<\theta<+\infty\}$. In $[\sigma_0,\sigma_1]$ applies $\overline{\Psi}(\sigma)\in C$ and $\overline{\Psi}(\sigma)$ here as a limited variation domain. The conditions for $\overline{\Psi}(\sigma)$ and $K(\sigma)$ are precisely described later. A gas-dynamical problem with data on the characteristic and on the free surface are contained in the boundary value problem just given. By four transformations given here the above mentioned boundary value problem is reduced to the form: $M(v)=0;\ v|_{\eta=\xi}=\Psi^*(\sigma)K^{1/4}(\sigma)=p(\xi);\ v|_{\xi=0}=v|_{\xi=1}=0.$

Card 1/2 For the solution of this problem the family of the particular so-

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The Boundary Value Problem For the Equation $\Psi_{\sigma\sigma}-K(\sigma)\Psi_{\theta\theta}=0$ With Data On the Straight σ = const. 20-5-2/67

lutions of the equation $L(\Psi)=\Psi_{\sigma\sigma}-K(\sigma)\Psi_{\theta\theta}=0, K(\sigma)\in C$ are used. This solution family is obtained in the usual manner by separation of the variables ξ, ϑ. For this purpose the series $T=\sum_n c_n B_n(\xi)\exp(i\mu_n\vartheta)$, where the c_n for the time being denote indetermined complex numbers. μ_n and $B_n(\xi)$ are the eigen numbers and the normed eigenfunctions of the problem by STURM-LIOUVILLE.
Carrying out of computations is followed step by step and the corresponding theorems are given.
(No illustrations)

ASSOCIATION Leningrad State University
PRESENTED BY SMIRNOV V.I., Member of the Academy
SUBMITTED 29.10.1956
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APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANTSEV, R.G.

20-5-1/60

AUTHOR BARANTSEV, R.G.

TITLE ~~A Mixed Problem~~ for Equation $\psi_{\sigma\sigma} - K(\sigma) = \psi_{\theta\theta} = 0$ with CAUCHY Data Given on Curve $\theta = s(\sigma)$
(Smeshannaya zadacha dlya uravneniya $\psi_{\sigma\sigma} - K(\sigma) = \psi_{\theta\theta} = 0$ s dannymi Koshi po krivoy $\theta = s(\sigma)$. Russian)

PERIODICAL Doklady Akademii Nauk SSSR, 1957, Vol 114, Nr 5, pp 919-922 (U.S.S.R.)

ABSTRACT In a previous paper the author investigated a boundary value problem for the equation $\psi_{\sigma\sigma} - K(\sigma)\psi_{\theta\theta} = 0$, $K(\sigma) \in C^2$ in hyperbolic $(K(\sigma) > 0)$ strips $S\{\sigma_0 \leqslant \sigma \leqslant \sigma_1, -\infty < \theta < +\infty$ with assumed ψ = const. on the straight lines $\sigma = \sigma_0$, $\sigma = \sigma_1$ and with $\psi = \overline{\psi}(\sigma)$ on the section of the characteristic between these straight lines. From this problem there results the problem under investigation here if the last condition is replaced by the CAUCHY data on the section of a certain not characteristic curve $\theta = s(\sigma)$. First the above equation is transformed, so that the problem under investigation has the following aspect:

$L(v) \equiv v_{\xi\xi} - v_{\vartheta\vartheta} + N(\xi)v = 0; v|_{\xi=0} = v|_{\xi=1} = 0; v|_{\vartheta=\ell(\xi)} = p(\xi);$

$v_{\vartheta}|_{\vartheta=\ell(\xi)} = q(\xi)$. The present paper discusses a method of

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20-5-1/60

A Mixed Problem for Equation φ [illegible] $- K(\sigma) = \varphi_{\theta\theta} = 0$ with CAUCHY Data Given on Curve $\theta = s(\sigma)$

successfully solving this problem for various conditions which are imposed upon the functions N, ζ, p, q. The author sets up the solution of this problem in form of a series of particular solutions of the aforementioned equation:

$$v = \sum_{n=-\infty}^{\infty}{}' \; c_n B_n(\xi) \exp(-i \lambda_n \vartheta).$$ A corresponding theormen of developement is given, and proof is outlined. In conclusion the convergence of the series and of its derivatives is investigated. (No illustrations).

ASSOCIATION Leningrad State University "A.A. ZHDANOV" (Leningradskiy gosudarstvennyy universitet im A.A. Zhdanova)

PRESENTED BY SMIRNOV, V.I., Member of the Academy

SUBMITTED 25.12.1956

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APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

AUTHOR: BARANTSEV, R.G. 20-4-1/52

TITLE: The Expansion Theorems Connected With the Boundary Value Problems for the Equation $\psi_{\sigma\sigma} - K(\sigma)\psi_{\theta\theta} = 0$ (Dve teoremy razlozheniya, svyazannye s kraevymi zadachami dlya uravneniya $\psi_{\sigma\sigma} - K(\sigma)\psi_{\theta\theta} = 0$)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 117, Nr 4, pp 551-554 (USSR)

ABSTRACT: In the strip S $\{\sigma_0 \leq \sigma \leq \sigma_1, -\infty < \theta < +\infty\}$ let $K(\sigma) \geq \varepsilon > 0$ and $\theta = s(\sigma)$ be a certain curve with the endpoints (σ_0, θ_0) and (σ_1, θ_1). Given the problem

$$(1) \qquad \psi_{\sigma\sigma} - K(\sigma)\psi_{\theta\theta} = 0; \qquad \psi|_s = \bar{\psi}(\sigma)$$

$$\psi_\theta|_s = \begin{cases} \bar{\psi}_1(\sigma) & \text{if s is oriented with respect to the } \sigma\text{-axis} \\ \text{not prescribed} & \text{if s is a characteristic.} \end{cases}$$

Let s_n and $B_n(x)$ be eigennumbers and normed eigenfunctions of the Sturm-Liouville's problem

$$(2) \qquad B_n'' + \left[s_n + N(x)\right] B_n = 0$$

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$$B_n(0)\cos\alpha + B_n'(0)\sin\alpha = 0 \qquad B_n(1)\cos\beta + B_n'(1)\sin\beta = 0.$$

By the transformation

$$cx \int_{\sigma_0}^{\sigma} \sqrt{K}\, d\sigma, \quad ct = \theta - \theta_0, \quad c = \int_{\sigma_0}^{\sigma_1} \sqrt{K}\, d\sigma, \quad v(x,t) = \psi(\sigma,\theta) K^{1/4}(\sigma)$$

the problem (1) is brought to the form $v_{xx} - v_{tt} + N(x)v = 0$, $v|_{t=l(x)} = p(x)$, $v_t|_{t=l(x)} = q(x)$ or not prescribed, etc. Here $N(x) = -K^{-1/4}(\sigma)\dfrac{d^2K^{1/4}(\sigma)}{dx^2}$. Seeking the solution of this last problem in the form $v = \sum_{n=-\infty}^{\infty} c_n B_n(x)\exp(-i\lambda_n t)$, where $\lambda_{\pm n} = \pm\sqrt{s_n}$, then the satisfaction of the initial conditions on l leads to

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

Two Expansion Theorems Connected With the Boundary 20-4-1/52
Value Problems for the Equation $\psi_{\sigma\sigma} - K(\sigma)\psi_{\theta\theta} = 0$

$$p(x) \approx \sum_{n=-\infty}^{\infty}{}' c_n \bar{z}_n(x)$$

(3)

$$q(x) \approx \sum_{n=-\infty}^{\infty}{}' c_n(-i\lambda_n)\bar{z}_n(x)$$

where $\bar{z}_n(x) = B_n(x)\exp[-i\lambda_n l(x)]$. For $\bar{z}_n(x)$ the author obtains a certain relation of orthogonality and with its aid he obtains formal expressions of the coefficients c_n. Denoting the partial sums of the series (3) with $S_n^{(p)}(x)$ and $S_n^{(q)}(x)$, then as $n \to \infty$ for them there hold certain asymptotic relations which are compressed into two theorems. One of the theorems is a generalization of Langer's [Ref.2] results, while the other theorem overlaps with the results due to Mishoe [Ref.4].

Card 3/3 2 Soviet and 3 foreign references are quoted.

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

PRESENTED: By V.I.Smirnov, Academician, 3 June 1957

SUBMITTED: 31 May 1957

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

16(1)

AUTHOR: Barantsev, R.G. SOV/155-58-2-2/47

TITLE: The Generalization of the Fourier Method to the Mixed Problem With an Arbitrary Initial Surface (Obobshcheniye metoda Fur'ye na smeshannuyu zadachu s proizvol'noy nachal'noy poverkhnost'yu)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 2, pp 6-8 (USSR)

ABSTRACT: The mixed boundary value problem for a hyperbolic equation

(1) $Lu = f(X,t)$

was investigated by Ladyzhenskaya [Ref 1] for the initial conditions $u|_{t=0} = \tau(X)$, $u_t|_{t=0} = \nu(X)$. The author solves the problem for initial conditions $u|_{l(X)} = \tau(X)$, $u_t|_{l(X)} = \nu(X)$, where $t = l(X)$ is an arbitrary surface. Here the consideration is fundamental, that the pairs of functions $\{u(X,0);\ u_t(X,0)\}$ and $\{u[X,l(X)],\ u_t[X,l(X)]\}$ are in a one-to-one relation which can be expressed with the aid of the formula of Ostrogradskiy.

The author thanks L.V. Ovsyannikov and S.V. Vallander for their valuable suggestions.

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

The Generalization of the Fourier Method to the Mixed Problem With an Arbitrary Initial Surface SOV/155-58-2-2/47

There are 8 references, 7 of which are Soviet, and 1 French.

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

SUBMITTED: December 19, 1957

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

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66813

AUTHOR: Barantsev, R.G.

SOV/155-58-5-2/37

TITLE: Investigation of the Solutions of Boundary Value Problems for the Equation $u_{xx} - K(x)u_{tt} = 0$ in a Strip, on the Boundary of which a Degeneration or Singularity Occurs

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 5, pp 6 - 9 (USSR)

ABSTRACT: The present investigation completes the paper of the author [Ref 2]. He considers the problem

(1) $$u_{xx} - K(x)u_{tt} = 0$$

(2) $$u\big|_{t=l(x)} = p(x) \quad ; \quad x \in [0,1]$$

(3) $$u_{tt}\big|_{t=l(x)} = \begin{cases} q(x) & \text{if } |l'(x)| < \sqrt{K(x)} \\ \text{not defined, if } l'(x) \equiv \sqrt{K(x)} \end{cases} \quad x \in [0,1]$$

(4) $$u(0,t)\cos\xi + u_x(0,t)\sin\xi = 0 \qquad 0 < \xi \leqslant \pi$$
$$u(1,t)\cos\eta + u_x(1,t)\sin\eta = 0 \qquad 0 < \eta \leqslant \pi$$

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66813

Investigation of the Solutions of Boundary Value Problems for the Equation $u_{xx} - K(x)u_{tt} = 0$ in a Strip, on the Boundary of Which a Degeneration or Singularity Occurs

SOV/155-58-5-2/37

It is supposed: $K(x) = x^{\alpha}(1-x)^{\beta}\tilde{K}(x)$; $-1 < \alpha < 2$ for $\xi \neq \pi$; $-1 < \beta < 2$ for $\eta \neq \pi$; $-2 < \alpha < 2$ for $\xi = \pi$; $-2 < \beta < 2$ for $\eta = \pi$; $\tilde{K}(x)$ is a positive two times differentiable function on $[0,1]$. The solution is sought as series

$$(5) \qquad u(x,t) = \sum_{n=-\infty}^{+\infty}{}' c_n B_n(x) \exp(-i\lambda_n t)$$

where the $B_n(x)$ satisfy the condition (4) and the equation $B_n'' + \lambda_n^2 K B_n = 0$, while the c_n are formally determined from an orthogonality condition [Ref 1] . In [Ref 2] conditions are given under which the problem possesses a unique generalized solution. In the present paper the author applies the asymptotic formulas of Dorodnitsyn [Ref 3] to the slowly converging parts of the series (5), whereby the convergence

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66813

Investigation of the Solutions of Boundary Value Problems for the Equation $u_{xx} - K(x)u_{tt} = 0$ in a Strip, on the Boundary of Which a Degeneration or Singularity Occurs SOV/155-58-5-2/37

is improved and the proerties of the solutions can be investigated. The author gives conditions for the existence of a classical solution in the strip $S\left\{0 \leqslant x \leqslant 1,\ -\infty < t < +\infty\right\}$. Altogether there are 8 theorems without proofs. There are 3 Soviet references.

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

SUBMITTED: October 6, 1958

Card 3/3

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66814

SOV/155-58-5-3/37

AUTHOR: Barantsev, R.G.

TITLE: Extension of Singularities of the Solutions of an Equation of Hyperbolic Type in a Strip With Reflection from the Non-Regular Walls

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 5, pp 10 - 18 (USSR)

ABSTRACT: The paper starts from the preceeding publication of the author in which the solution $u(x,t)$ of a mixed boundary value problem is constructed for $u_{xx} - K(x)u_{tt} = 0$. The author investigates the behavior of the singularities (e.g. of the discontinuities of the functions p,q,l' or of their derivatives on $0 < x < 1$ and of the jumps of the boundary value conditions in the intersections of $t = l(x)$ with the boundaries of S) in the strip S, especially for reflection from the walls. Different cases are explicitly treated. The results are obtained by successive application of the asymptotic formulas of Dorodnitsyn for λ_n and $B_n(x)$.

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

66814

Extension of Singularities of the Solutions of an Equation of Hyperbolic Type in a Strip With Reflection from the Non-Regular Walls SOV/155-58-5-3/37

There are 9 references, 6 of which are Soviet, 2 American, and 1 French.

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

SUBMITTED: October 6, 1958

Card 2/2

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

16(1)

AUTHOR: Barantsev, R.G.

SOV/43-58-19-3/16

TITLE: Rigorous Solution of Some Boundary Value Problems for the Equation $\psi_{\sigma\sigma} - K(\sigma)\psi_{\theta\theta} = 0$ in the Hyperbolic Strip $\sigma_0 \leq \sigma \leq \sigma_1$ (Tochnoye resheniye nekotorykh krayevykh zadach dlya uravneniya $\psi_{\sigma\sigma} - K(\sigma)\psi_{\theta\theta} = 0$ v giperbolicheskoy polose $\sigma_0 \leq \sigma \leq \sigma_1$)

PERIODICAL: Vestnik Leningradskogo universiteta, Seriya matematiki, mekhaniki i astronomii, 1958, Nr 19(4), pp 19 - 38 (USSR)

ABSTRACT: The paper contains a detailed representation and proofs of the results announced by the author in [Ref 2]. There are 15 references, 6 of which are Soviet, 2 French, 5 American, 1 German, and 1 English.

SUBMITTED: February 9, 1957

Card 1/1

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

AUTHOR: Barantsev, R.G.

SOV/20-121-1-1/55

TITLE: Expansion Theorems Combined With Boundary Value Problems for the Equation $u_{xx}-K(x)u_{tt} = 0$ in the Strip $0 \leq x \leq 1$ for a Degeneration or Singularity on the Boundary (Teoremy razlozheniya, svyazannyye s krayevymi zadachami dlya uravneniya $u_{xx}-K(x)u_{tt} = 0$ v polose $0 \leq x \leq 1$ s vyrozhdeniyem ili singulyarnostyu na granitse)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 121, Nr 1, pp 9-12 (USSR)

ABSTRACT: The author considers the problem

$$u_{xx}-K(x)u_{tt} = 0, \qquad K(x) = x^{\alpha}(1-x)^{\beta} K_0(x)$$

$$u\big|_{t=l(x)} = p(x), \qquad x \in [0,1]$$

$$u_t\big|_{t=l(x)} \begin{cases} = q(x) \text{ if } |l'(x)| < \sqrt{K(x)}, \\ \text{not prescribed if } l'(x) \equiv \sqrt{K(x)} \end{cases} \qquad x \in [0,1]$$

$$u(0,t)\cos\xi + u_x(0,t)\sin\xi = 0, \qquad 0 < \xi \leq \pi,$$

$$u(1,t)\cos\eta + u_x(1,t)\sin\eta = 0, \qquad 0 < \eta \leq \pi.$$

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Expansion Theorems Combined With Boundary Value Problems for the Equation $u_{xx}-K(x)u_{tt} = 0$ in the Strip $0 \leq x \leq 1$ for a Degeneration or Singularity on the Boundary

Here $K_o(x)$ is positive on $[0,1]$ and two times differentiable and

$\alpha > -1$ for $\xi \neq \pi$, $\beta > -1$ for $\eta \neq \pi$

$\alpha > -2$ for $\xi = \pi$, $\beta > -2$ for $\eta = \pi$.

The solution is set up in the form

$$u(x,t) = \sum_{n=-\infty}^{\infty}{}' c_n B_n(x) \exp(-i \lambda_n t),$$

where λ_n and B_n are given by

$$B_n'' + \lambda_n^2 K B_n = 0$$

$$B_n(0)\cos\xi + B_n'(0)\sin\xi = 0, \quad B_n(1)\cos\eta + B_n'(1)\sin\eta = 0,$$

$$\lambda_{-n} = -\lambda_n.$$

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

Expansion Theorems Combined With Boundary Value Problems for the Equation $u_{xx}-K(x)u_{tt} = 0$ in the Strip $0 \leq x \leq 1$ for a Degeneration or Singularity on the Boundary SOV/20-121-1-1/55

Then the conditions on $t = l(x)$ yield expansions of $p(x)$ and $q(x)$. Under certain assumptions on $l(x)$, $p(x)$, $q(x)$, in four long theorems the author gives assertions on the convergence of these expansions with respect to $p(x)$, $q(x)$ and $\frac{p(x-0)+p(x+0)}{2}$ respectively etc.

The paper is a continuation of the author's dissertation [Ref 1]. There are 2 Soviet references.

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

PRESENTED: March 4, 1958, by V.I.Smirnov, Academician

SUBMITTED: March 3, 1958

1. Mathematics

Card 3/3

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

SOV/

16(1)

AUTHOR: Barantsev, R.G.

TITLE: On the Goursat Problem for the Equation of Chaplygin Type (K zadache Gursa dlya uravneniya tipa Chaplygina)

PERIODICAL: Vestnik Leningradskogo universiteta, Seriya matematiki, mekhaniki i astronomii, 1959, Nr 1(1), pp 51-56 (USSR)

ABSTRACT: The Goursat problem for the Chaplygin equation

$$(\alpha-\tau)\psi_{\theta\theta} + 4\alpha\tau^2(1-\tau)\psi_{\tau\tau} + 4\alpha\tau\left[1+(\beta-1)\tau\right]\psi_{\tau} = 0$$

is solved by a set up with Fourier series, whereby the originally slow velocity of convergence is improved by suitable splitting up of the coefficients up to $O(n^{-4})$. The method can be extended to the equations $\psi_{\sigma\sigma} - K(\sigma)\psi_{\theta\theta} = 0$, $K(\sigma) \in C^{(2)}$, if $K(\sigma)$ is positive in the considered strip, while outside of the strip and on the boundary there are admitted zeros or poles.

The author thanks S.V.Valander for valuable indications.

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Card 2/

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

16(1) SOV/43-59-1-6/17

AUTHOR: Barantsev, R.G.

TITLE: On the Goursat Problem for the Equation of Chaplygin Type (K zadache Gursa dlya uravneniya tipa Chaplygina)

PERIODICAL: Vestnik Leningradskogo universiteta, Seriya matematiki, mekhaniki i astronomii, 1959, Nr 1(1), pp 51-56 (USSR)

ABSTRACT: The Goursat problem for the Chaplygin equation

$$(\alpha-\tau)\Psi_{\theta\theta} + 4\alpha\tau^2(1-\tau)\Psi_{\tau\tau} + 4\alpha\tau\left[1+(\beta-1)\tau\right]\Psi_{\tau} = 0$$

is solved by a set up with Fourier series, whereby the originally slow velocity of convergence is improved by suitable splitting up of the coefficients up to $O(n^{-4})$. The method can be extended to the equations $\Psi_{\sigma\sigma} - K(\sigma)\Psi_{\theta\theta} = 0$, $K(\sigma) \in C^{(2)}$, if $K(\sigma)$ is positive in the considered strip,

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On the Goursat Problem for the Equation of Chaplygin Type SOV/43-59-1-6/17

There are 2 figures, and 4 Soviet references.

SUBMITTED: August 27, 1957

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16(1)

2

AUTHOR: Barantsev, R. G.

SOV/43-59-19-2/14

TITLE: Boundary Value Problems for the Hyperbolic Equation $u_{xx}-K(x)u_{tt}=0$ in the Strip $0 \leqslant x \leqslant 1$ With Degeneration or Singularity on the Boundary. I. Development Theorems

PERIODICAL: Vestnik Leningradskogo universiteta, Seriya matematiki, mekhaniki i astronomii, 1959, Nr 19(4), pp 13-35 (USSR)

ABSTRACT: The author considers the boundary value problem

(1.1) $Lu \equiv u_{xx}-K(x)u_{tt} = 0$

(1.2) $u|_{t=l(x)} = p(x), \quad x \in [0,1]$

(1.3) $u_t|_{t=l(x)} \begin{cases} = q(x) & \text{if } |l'(x)| < \sqrt{K(x)}, \ x \in [0,1] \\ \text{not prescribed} & \text{if } l'(x) \equiv \sqrt{K(x)}, \ x \in [0,1] \end{cases}$

(1.4) $u(0,t)\cos\xi + u_x(0,t)\sin\xi = 0, \quad 0 < \xi \leqslant \pi$

$u(1,t)\cos\eta + u_x(1,t)\sin\eta = 0, \quad 0 < \eta \leqslant \pi$

where

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Boundary-Value Problems for the Hyperbolic Equation $u_{xx}-K(x)u_{tt}=0$ in the Strip $0 \leq x \leq 1$ With Degeneration or Singularity on the Boundary. I. Development Theorems SOV/43-59-19-2/14

(1.7) $\alpha > -2$ for $\xi = \pi$, $\beta > -2$ for $\eta = \pi$.

The solution is sought in the form

(1.8) $$u(x,t) = \sum_{n=-\infty}^{+\infty}{}' c_n B_n(x) \exp(-i\lambda_n t),$$

where λ_n and $B_n(x)$ are eigenvalues and eigenfunctions of the problem

(1.9) $B_n'' + \lambda^2 K B_n = 0$

(1.10) $B_n(0)\cos\xi + B_n'(0)\sin\xi = 0$, $B_n(1)\cos\eta + B_n'(1)\sin\eta = 0$

$(\lambda_{-n} = -\lambda_n,\ B_{-n}(x) = -B_n(x))$.

Based on the investigations of the spectrum of (1.9)-(1.10) by A.A.Dorodnitsyn [Ref 3] for the case $\alpha < 2$, $\beta < 2$, the author obtains conditions under which the formally obtained developments

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Boundary Value Problems for the Hyperbolic Equation $u_{xx}-K(x)u_{tt}=0$ in the Strip $0\leqslant x\leqslant 1$ With Degeneration or Singularity on the Boundary. I. Development Theorems SOV/43-59-19-2/14

$$(1.12)\quad p(x)\approx\sum{}' c_n B_n(x)\exp\left[-i\lambda_n l(x)\right]$$

$$(1.13)\quad q(x)\approx\sum{}' (i\lambda_n) c_n B_n(x)\exp\left[-i\lambda_n l(x)\right]$$

are valid. There are 4 theorems altogether.
There are 6 references, 4 of which are Soviet, 1 French, and 1 English.

SUBMITTED: February 24, 1958

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BARANTSEV, R. G., ALEKSEYEVA, E. V. (Leningrad)

"A Circular Plate in Almost Free-Molecule Flows."

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

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C 111/ C 333

AUTHOR: Barantsev, R. G.

TITLE: Boundary value problems for the hyperbolic equation $u_{xx}-K(x)u_{tt} = 0$ in the strip $0 \leq x \leq 1$ with degeneration or singularity on the boundary. II. Investigation of the solutions

PERIODICAL: Leningrad. Universitet. Vestnik. Seriya matematiki, mekhaniki i astronomii, no. 1, 1960, 14-33

TEXT: The paper is a continuation of R. G. Barantsev (Ref.1: Vestnik LGU, No. 19, 1959). The author uses the notations of (Ref.1). He considers the problem (C)

$$u_{xx} - K(x)\, u_{tt} = 0 \qquad (1.1)$$

$$u\big|_{t=l(x)} = p(x), \quad x \in [0,1] \qquad (1.2)$$

$$u_t\big|_{t=l(x)} \begin{cases} = q(x), \text{ if } |\, l'(x)\,| < \sqrt{K(x)} \\ \text{not given, if } l'(x) \equiv \sqrt{K(x)} \end{cases} \quad x \in [0,1] \qquad (1.3)$$

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$$u(0,t)\cos\xi + u_x(0,t)\sin\xi = 0,\quad 0 < \xi \leq \pi$$
$$u(1,t)\cos\eta + u_x(1,t)\sin\eta = 0,\quad 0 < \eta \leq \pi \qquad (1.4)$$

The author supposes that

$$K(x) = x^{\alpha}(1-x)^{\beta}\,\bar{K}(x) \qquad (1.5)$$

$$\alpha > -1 \text{ for } \xi \neq \pi,\quad \beta > -1 \text{ for } \eta \neq \pi; \qquad (1.6)$$

$$\alpha > -2 \text{ for } \xi = \pi,\quad \beta > -2 \text{ for } \eta = \pi; \qquad (1.7)$$

$$\alpha < 2,\quad \beta < 2; \qquad (2.11);$$

$\bar{K}(x)$ is a twice differentiable positive function in $[0,1]$.
The solution has been obtained in (Ref.1) as series

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$$u(x,t) = \sum_{n=-\infty}^{+\infty} c_n B_n(x) \exp(-i\lambda_n t) \qquad (1.8)$$

where λ_n and $B_n(x)$ were given by (1.9) - (1.11) (see (Ref.1)). The coefficients c_n were formally defined by (1.14) for $|l'(x) < \sqrt{K(x)}$ and by (1.15) or (4.18) for $l'x \equiv \sqrt{K(x)}$.

In the present paper the author investigates in what extent and under which conditions the series (1.8) represents a classical or generalized solution of the problem (C).

The velocity of convergence of the series (1.8) and of its termwise derivatives depends on the smoothness of the functions K, l, p, q and on the compatibility of the boundary conditions in the points of intersection of the curve $t = l(x)$ with the boundary of the strip $S\{0 \leqq x \leqq 1, -\infty < t < +\infty\}$. Therefore, the author investigates the asymptotic behavior of the coefficients of (1.8)

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under different assumptions. The series (1.8) is used in the form

$$u(x,t) = 2 \operatorname{Re} \left\{ \sum_{n=1}^{\infty} C_n \varphi_n(x) \exp(-i\lambda_n t) \right\} \qquad (5.5)$$

where $C_n = \frac{c_n}{\sqrt{N_n}}$, $\varphi_n(x) = \varphi(x, \lambda_n) = \sqrt{N_n}\, B_n(x)$, $\varphi(x,\lambda)$ is defined in (Ref.1), $N_n = \frac{\Delta'(\lambda_n)}{2\lambda_n K_n}$, $\Delta(\lambda)$ is the Wronski determinant of the functions $\varphi(x,\lambda)$ and $\chi(x,\lambda)$ from (Ref.1). The asymptotic expressions for the coefficients are substituted in (5.5) which leads to the following results (notations see (Ref.1): In the case $l' \equiv \sqrt{K}$ there hold:

Theorem 1: In (0,1) let $l(x) \equiv \rho(x)$ and $p'(x) = x^{a-1}(1-x)^{b-1} g(x)$, where

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Boundary value problems . . . S/043/60/000/001/002/014
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$$a > -\frac{\alpha}{2} \text{ for } \alpha \leqq 0, \quad b > -\frac{\beta}{2} \text{ for } \beta \leqq 0; \tag{8.5}$$

$$a > -\frac{\alpha}{4} \text{ for } \alpha \geqq 0, \quad b > -\frac{\beta}{4} \text{ for } \beta \geqq 0. \tag{8.6}$$

If

$$p(0+) = 0 \text{ for } \xi = \pi \text{ in the case } \alpha \leqq 0,$$
$$p(1-) = 0 \text{ for } \eta = \pi \text{ in the case } \beta \leqq 0, \tag{8.7}$$

then (5.5) is uniformly convergent in the strip $S' \{0 < x_1 \leqq x \leqq x_2 < 1, -\infty < \tau < +\infty.\}$

Theorem 2: In (0,1) let $l(x) \equiv \rho(x)$ and $p''(x) = x^{a-2}(1-x)^{b-2} g(x)$, where

$$a > 1 + \frac{\alpha}{4}, \quad b > 1 + \frac{\beta}{4}. \tag{8.15}$$

There hold (8.5), (8.7) and

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Boundary value problems . . . S/043/60/000/001/002/014
C 111/ C 333

$$\left.\begin{array}{l} p(0+)\cos\xi + p'(0+)\sin\xi = 0 \quad \text{for } \alpha \geqq 0,\ 0 < \xi \leqq \pi \\ p(1-)\cos\eta + p'(1-)\sin\eta = 0 \quad \text{for } \beta \geqq 0,\ 0 < \eta \leqq \pi \end{array}\right\} \quad (8.16).$$

If then

$$R = 0 \quad (8.17)$$

then the series

$$\frac{\partial u}{\partial l_{\pm}} = \frac{\partial u}{\partial x} \pm \sqrt{K}\,\frac{\partial u}{\partial t} = 2\,\mathrm{Re}\left\{\sum_{n=1}^{\infty} c_n\left[\varphi_n' \mp i\lambda_n\sqrt{K}\varphi_n\right]e^{-i\lambda_n t}\right\} \quad (8.8)$$

are uniformly convergent, and consequently $u \in C^{(1)}$ in S'. Here

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C 111/ C 333

Boundary value problems . . .

$$R=p'(0+)-p'(1-)+K^{1/4}(x_*)\int_0^{x_*}\left[p'(x)-p'(0+)\right](K^{-1/4})'\,dx+$$

$$+K^{1/4}(x_*)\int_{x_*}^{1}\left[p'(x)-p'(1-)\right](K^{-1/4})'\,dx \qquad (6.18)$$

where x_* is the point of discontinuity of $p'(x)$.

Theorem 3 gives conditions that $u \in C^{(2)}$ in S'.

In the case $|l'|<\sqrt{K}$ there hold

Theorem 4: In (0,1) let $|l'(x)|<\sqrt{K(x)}$ and $Q'_{\pm}(x) = x^{a-2}(1-x)^{b-2}g(x)$, where

$$a > 1+\frac{\alpha}{4},\ b > 1+\frac{\beta}{4}; \qquad (8.27)$$

$$a > -\frac{\alpha}{2},\ b > -\frac{\beta}{2}. \qquad (8.28)$$

If then

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$$\left[p \cos \xi + (p' - ql') \sin \xi\right]_{x=0+} = 0 \begin{cases} \text{for } \alpha \geqq 0 \text{ for } \xi \in (0, \pi], \\ \text{for } \alpha < 0 \text{ for } \xi = \pi; \end{cases} \quad (8.29)$$

$$p \cos \eta + (p' - ql') \sin \eta \Big]_{x=1-} = 0 \begin{cases} \text{for } \beta \geqq 0 \text{ for } \eta \in (0, \pi], \\ \text{for } \beta < 0 \text{ for } \eta = \pi, \end{cases} \quad (8.30),$$

then the series (8.8) converge uniformly, and consequently $u \in C^{(1)}$ in S'.

Theorem 5 gives conditions for $u \in C^{(2)}$ in S'.

For the strip $S \{ 0 \leqq x \leqq 1 \}$ there hold:

Theorem 6: Under the assumptions of theorem 1 it holds $u \in C$ in S, if simultaneously $\alpha \leqq 0$ and $\beta \leqq 0$; if, however, $\alpha > 0$ ($\beta > 0$), it holds only if $a > 0$ ($b > 0$) and $p(0+) = 0$ for $\xi = \pi$ ($p(1-) = 0$ for $\eta = \pi$).

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Theorem 7: Under the assumptions of theorem 2 it holds $u \in C^{(1)}$ in S, if simultaneously $\alpha \geqq 0$ and $\beta \geqq 0$. If, however, $\alpha < 0 (\beta < 0)$, then it holds only if $a > 1$ $(b > 1)$ and $p(0+) \cos \xi + p'(0+) \sin \xi = 0$ for $\xi (0, \pi]$ (or $p(1-) \cos \eta + p'(1-) \sin \eta = 0$ for $\eta \in (0, \pi]$).

Theorem 8: Under the assumptions of theorem 4 it holds $u \in C^{(1)}$ in S, if simultaneously $\alpha \geqq 0$, $\beta \geqq 0$. If, however, $\alpha < 0$ $(\beta < 0)$, then it holds only if $a > 1 (b > 1)$ and $[p \cos \xi + (p' - ql') \sin \xi]_{x=0+} = 0$ for $\xi \in (0, \pi]$ (or $[p \cos \eta + (p' - ql') \sin \eta]_{x=1-} = 0$ for $\eta \in (0, \pi]$).

There are 4 Soviet-bloc references.

SUBMITTED: October 7, 1958

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S/043/61/000/003/003/008
D201/D305

AUTHORS: Barantsev, R.G. and Wu Tsjen-yu

TITLE: Forces and moments acting on bodies of revolution in free molecule flow

PERIODICAL: Leningrad Universitet. Vestnik. Seriya matematiki, mekhaniki i astronomii, no. 3, 1961, 79-92

TEXT: Formulas are obtained for the aerodynamic coefficients c_x, c_y and c_m of yawed convex bodies of revolution in free-molecule equilibrium flow, under the assumption of diffuse-specular reflection of the molecules on the body-surface. Particular cases are given where the integration was fully carried out (plates, cylinders, spheres), or could be reduced to one quadrature (cones, longitudinal and transverse flow). Asymptotic formulas are obtained for the coefficients, when the relative flow-velocity $s \to \infty$. The formulas for the coefficients are

$$c_x = \frac{1}{\pi R^2} \iint_S (p \cos\theta + \tau \sin\theta)\, dS, \qquad (2.18)$$

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$$c_y = \frac{1}{\pi R^2} \iint_S (-p + \tau \operatorname{ctg}\theta) \cos(n,y)\, dS, \qquad (2.19)$$

$$c_m = \frac{1}{\pi R^2 L} \iint_S \{-p \cos\varphi (\ell \cos\beta + r \sin\beta) + \tau (\sin\delta \sin\beta + \cos\delta \operatorname{ctg}\theta \cos(n,y)) + r \cos\varphi (\cos\delta \sin\theta + \sin\delta \operatorname{ctg}\theta \cos(n,y))\}\, dS \qquad (2.20)$$

p is the pressure, S the body-surface, the angle of attack, the angle of rotation of the curve which generated S, the angle between the velocity U of S and the outer normal, $\tau = \frac{2pt}{\rho U^2}$. In the general case the integration cannot be carried out. For a cone with apex at the origin and a semi-angle $\beta \in (0, \pi/2)$, the expressions for the coefficients are

$$c_x = \frac{T_x(\beta,\delta)}{\pi \sin\beta} \qquad c_y = \frac{T_y(\beta,\delta)}{\pi \sin\beta} \qquad (3.8)$$

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$$c_m = \frac{\lambda}{2\pi \sin \beta_1} T_m^{(k)}(\beta, \delta) \qquad (3.9)$$

where $T_x(\beta, \delta)$ and $T_y(\beta, \delta)$ are given by

$$T_x(\beta, \delta) = \int_0^{\beta} (p_1 + p_2 \cos \delta) d\varphi \qquad (2.25)$$

$$T_y(\beta, \delta) = \int_0^{\beta} (c + d \cos \delta) p_1 d\varphi \qquad (2.26)$$

and $T_m^{(k)}(\beta, \delta)$ by

$$T_m^{(k)}(\beta, \delta) = \int_0^{\beta} \{ p_2 \cos \varphi + (1 - \sigma \cos \delta) p_1 \} d\varphi$$

For a circular plate the coefficients are

$$c_x = \frac{\lambda (s \cos \delta)}{s \sqrt{\pi}} \left\{ \sigma + \frac{g}{2} \frac{c_r}{c_i} \frac{\sqrt{\pi}}{s} \cos \delta + 2(1 - \sigma) \cos^2 \delta \right\} + \frac{2 g}{2 s^2} \cos \delta \left[1 + \operatorname{erf}(s \cos \delta) \right] \qquad (3.10)$$

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$$c_y = \frac{\sin\delta}{s\sqrt{\pi}} \chi(s\cos\delta) \left[2(1 - \sigma)\cos\delta + \frac{\sigma}{2}\frac{c_r}{c_i}\frac{\sqrt{\pi}}{s} \right] - \frac{2\sigma}{2s^2}\sin\delta\left[1 + \operatorname{erf}(s\cos\delta)\right], \qquad (3.11)$$

$$c_m = 0$$

where $s = U/c_i$ (c_i being the coefficient of the incident molecule flow; c_r of reflected flow), and

$$\operatorname{erf} z = \frac{2}{\sqrt{\pi}}\int_0^z e^{-x^2}dx$$

$$\chi(z) = e^{-z^2} + \sqrt{\pi}\, z\,(1 + \operatorname{erf} z), \qquad (2.32)$$

$z = s\cos\theta$. Asymptotic formulas are obtained for T_x, T_y and T_m when $s \to \infty$. T_x, T_y and T_m are integral expressions related to the formulas for c_x, c_y and c_m respectively. The expansion of these integral expressions was carried out on the basis of a theorem by

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Forces and moments. .

A.N. Tikhonov and [illegible] Samarskiy (Ref. 8: O razloznenii po parametru integralov s yadrom tipa δ-funktsii. Nauch. dokl. vys. shkoly. Fiziko-matematicheskiye nauki, no. 1, 54-61, 1959). For the case $\beta = 20^{\circ}$, the dependence of the aerodynamical coefficients of a cone on the angle of attack δ was calculated - for the three values of $s = \infty, 10, 5$ - from the formulas obtained, and given in graphic and tabulated form. For the case $\delta = \beta$, $\varphi_0 = 0$ the theorem of Ref. 8 (op. cit) is inapplicable; c_x, c_y and c_m are calculated for this case too. There are 3 figures, 2 tables and 10 references: 4 Soviet-bloc and 6 non Soviet bloc. The references to the English-language publications read as follows: G.N. Patterson, Molecular flow of gases. New York, 1956; H. Ashley, Applications of the theory of free molecule flow to aeronautics, J. Aeron. sci., 16, 2, 95-104, 1949; transl. into Russ. in "Sovremennaya tekhnika", no. 7, 3-14, 1949; M. Heineman, Theory of drag in highly rarefied gases. Comm. appl. math., 1, 3, 359-273, 1948; transl. into Russ. in "Mekhanika", no. 2, 28-39, 1951; L. Talbot, Free molecule flow forces and heat transfer for an infinite circular cylinder at angle of attack, J. aeron. sci., 24, 6, 458-459, 1957.

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANTSEV, ~~R.G. (Le~~ningrad); MIKHAYLOVA, I.A. (Leningrad); TSITELOV, I.M. (Leningrad)

Determining the order of perturbation functions in the method of minor perturbations. Inzh.zhur. 1 no.2:69-81 '61. (MIRA 14:12)
(Perturbation)

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANTSEV, R.G.

Scattering of plane waves on a double-periodical surface of arbitrary shape. Akust.zhur. 7 no.2:155-158 '61. (MIRA 14:7)

1. Leningradskiy gosudarstvennyy universitet.
(Sound waves—Scattering)

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

BARANTSEV, R.G.; U TSZZHEN'-YUY

Forces and moments acting on the bodies of revolution in a free-molecule flow [with summary in English]. Vest. LGU no.13:79-92 '61. (MIRA 14:7)

(Molecular dynamics)

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103520015-4

ALEKSENKO, I.I.; BARANTSEV, R.G.; PANTELEYEVA, I.N.

Transverse approximation method in hypersonic aerodynamics. Vest. LGU 17 no.19:62-78 '62. (MIRA 15:10)
(Aerodynamics, Hypersonic)

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B108/B102

30 1100

AUTHOR: Barantsev, R. G.

TITLE: Asymptotic smoothening of the discontinuity in a monatomic gas

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 3, 1962, 889-895

TEXT: An attempt is made to determine the structure of a shock wave far from its front. The calculations are based on the complete one-dimensional equation of motion of a monatomic gas, which is solved by successive approximation. Density, velocity, and temperature are determined in first approximation. It is shown that the asymptotic behavior of these quantities far from the wave front is essentially dependent on the properties of the collision integral $J = \Phi - fQ$ (f - distribution function, $\Phi = f_0/\tau$ - "creation function", $Q = 1/\tau$ = const - collision function (S. V. Vallander. DAN SSSR, 131, 1, 1960)). The smoothening of the discontinuity is determined by the collision cross section at high velocities. It is exponential when with $v \to \infty$ the collision cross section

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tends to a nonzero limit. When $\sigma(v) = O(v^{-\gamma})$ at high velocities v, and when $\gamma > 0$, the hydrodynamic quantities will approach their limits far from the wave front as $c_1 \exp(-c_2|x|^{2/(\gamma+2)})$; ($c_1, c_2$ = const). There are 4 Soviet references.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet (Leningrad State University)

SUBMITTED: October 21, 1961

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S/020/62/147/003/012/027
B104/B166

AUTHOR: Barantsev, R. G.

TITLE: Separation of variables in the problem of scattering from an arbitrary body

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 3, 1962, 569 - 570

TEXT: The use of the separation of variables is studied for the steady problem of scattering from a body of arbitrary shape for any ratio of wavelength to size of the body. The solution of the equation $\Delta\psi + k^2\psi = 0$ (1) on the sphere $r = R > h = \max_S\{r\}\psi$ can be expanded into series

$$\psi = \sum_{l=0}^{\infty} \sum_{m=-l}^{l} X_{lm}(r)\, Y_{lm}(\vartheta, \varphi) \qquad (2)$$

with respect to the spherical harmonics

$$Y_{lm}(\vartheta, \varphi) = \sqrt{\frac{(l-|m|)!\,(2l+1)}{(l+|m|)!\,4\pi}}\, P_l^{|m|}(\cos\vartheta)\, e^{im\varphi}, \qquad (3)$$

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whose coefficients

$$X_{lm}(r) = c_{lm}^{+} X_l^{+}(r) - c_{lm}^{-} X_l^{-}(r) \tag{4}$$

constitute the solutions of the equations

$$\frac{1}{r^2}\frac{d}{dr}\left(r^2 \frac{dX_l}{dr}\right) + \left(k^2 - \frac{l(l+1)}{r^2}\right) X_l = 0. \tag{5}$$

Under the assumptions

$$X_l^{+}(r) = X_l^{-*}(r), \tag{6}$$

$$X_l^{+} X_l^{-\prime} - X_l^{+\prime} X_l^{-} = \frac{2}{ikr^2}, \tag{7}$$

the author arrives at

$$X_l^{+}(r) = \sqrt{\frac{\pi}{2kr}}\, H^{(1)}_{l+\frac{1}{2}}(kr). \tag{8}$$

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Green's formula, applied for the region between the surface S of the body and the sphere r = R upon the expression $\psi\Delta\varphi - \varphi\Delta\psi$, where

$$\varphi = \varphi_{lm}^{\pm} = X_l^{\pm *}(r)\, Y_{lm}^{*}(\vartheta, \varphi), \qquad (9),$$

leads to the expressions

$$c_{lm}^{\pm} = \frac{ik}{2} \iint_S \left(\psi \frac{\partial \varphi_{lm}^{\pm}}{\partial n} - \varphi_{lm}^{\pm} \frac{\partial \psi}{\partial n} \right) dS. \qquad (10)$$

for the amplitudes of the incoming and outgoing waves. The scattering problem is as follows: A sequence of amplitudes c_{lm}^{-} of the divergent waves be given. l = 0, 1, 2,...; m = -l,..., l. A linear relationship is to connect ψ with $\partial\psi/\partial n$ upon S. The sequence of the amplitudes c_{lm}^{+} of the convergent waves is sought. When $\psi|_S = 0$ and $\partial\psi/\partial n|_S = q$, the scattering problem is reduced to searching the functionals of q,

$$c_{lm}^{+} = \frac{k}{2i} \iint_S \varphi_{lm}^{+} q\, dS \qquad (11),$$

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from a given sequence of other functionals

$$c_{lm}^{-} = \frac{k}{2i} \iint_S \varphi_{lm}^{-} q \, dS \qquad (12)$$

of the unknown function q. $c_{lm}^{-} = i^{l}\sqrt{\pi(2l+1)}$ for an incident plane wave. The method proposed can be extended also to the Schrödinger equation.

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AUTHOR: Barantsev, R. G.

TITLE: Asymptotic formulas for the coefficients of exchange of impulse and energy on the surface of a body in a rarified gas

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TOPIC TAGS: statistical mechanics, fluid mechanics, physical chemistry, gas, energy transfer, impulse transfer, exchange coefficient

ABSTRACT: The impulse and energy transferred by a quantity of gas depend on a series of parameters related, for example, to the inflowing current and to the law of reflection of the molecules from a surface. It is possible to study, however, the asymptotic dependence of the exchange coefficients on a few parameters within a region of definition, without knowing concretely the dependence of the coefficients on other parameters. The present paper develops the main term of an asymptotic expansion for the dependence of the exchange coefficients on the Mach number $\overline{M}$, for a free molecular current of a monatomic gas, where the range of validity of the asymptotic formula is for $M \to \infty$;

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a similar formula is developed corresponding to the roughness parameter σ, corresponding to the range $\sigma \to 0$. These formulas are valid for any law of reflection of the molecules from the surface. Orig. art. has: 74 formulas.

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