ZEMSKAYA, A.A.; GROKHOVSKAYA, I.M.

Ticks on Siberian chipmunks in the Maritime Territory. Med. paraz. i paraz.bol. 28 no.2:152-157 Mr-Ap '59. (MIRA 12:6)

1. Iz otdela prirodnoochagovykh bolezney Instituta epidemiologii i mikrobiologii imeni N.F.Gamalei AMN SSSR (dir.instituta - prof. S.N.Muromtsev, zav.otdelom - prof.P.A.Petrishcheva).
(TICKS
on striped squirrels in Maritime Region, USSR (Rus))
(MITES
same)
(RODENTS
striped squirrels, infestation by mites & ticks in Maritime Region, USSR (Rus))

SHLUGER, Ye.G.; GROKHOVSKAYA, I.M.; DAN VAN NOY; NGUYEN SON KHOE; DO KIN TUNG

New species of chiggers (Acariformes, Trombiculidae) from bats of North Vietnam. Zool.zhur. 38 no.3:418-425 Mr '59. (MIRA 12:4)

1. Department of Infections of Natural Nidality, Institute of Epidemiology and Microbiology, Academy of Medical Sciences of the U.S.S.R. (Moscow), and Chair of Parasitology, Hanoi University (Republic of Viet-Nam).
(Vietnam, North--Chiggers (Mites)) (Parasites--Bats)

SHLUGER, Ye.G.; GROKHOVSKAYA, I.M.; DAN-VAN-NGY; NGUYEN-SON-KHOE; DO-KIN-TUNG

Chigger fauna (Acariformes, Trombiculidae) of North Vietnam.
Paraz.sbor. 19:169-193 '60. (MIRA 13:8)

1. Institut epidemiologii i mikrobiologii im.N.F.Gamalei AMN SSR i Khanoyskiy universitet Demokraticheskoy Respubliki V'yetnam.
(Vietnam, North--Chiggers(Mites))

SHLUGER, Ye.G.; GROKHOVSKAYA, I.M.; DAN-VAN-NGY; NGUYEN-SON-KHOE; DO-KIN-TUNT.

Chiggers of the genus Gahrliepia (Acariformes, Trombiculidae) from North Vietnam. Ent. oboz. 39 no.2:462-476 '60. (MIRA 13:9)

1. Otdel infektsiy s prirodnoy ochagovost'yu Instituta epidemiologii i mikrobiologii imeni N.F.Gamaleya Akademii meditsinskikh nauk SSSR, Moskva, i Kafedra parazitologii Khanoyskogo universiteta, Khanoy.
(Vietnam, North--Chiggers (Mites))

GROKHOVSKAYA, I.M.

Studying ectoparasites of the lemming Dicrostonyx torquatus Pall.
Zool.zhur. 39 no.7:1093-1095 Jl '60. (MIRA 13:7)

1. Department of Infections of Natural Nidality, Institute of Epidemiology and Microbiology, U.S.S.R. Academy of Medical Sciences, Moscow.

(Kanino-Dimanskiy District—Insects, Injurious and beneficial)
(Parasites—Lemmings)

SHLUGER, Ye.G.; GROKHOVSKAYA, I.M.; DAN VAN NGY; NGUYEN SUAN KHOE; DO KIN TUNG

Species of the subgenus Leptotrombidium (Acariformes, Trombiculidae) from North Vietnam. Zool. zhur. 39 no.12:1790-1801 '60. (MIRA 14:1)

1. Department of Infections of Natural Nidality, Institute of Epidemiology and Microbiology, U.S.S.R. Academy of Medical Sciences, Moscow, and Department of Parasitology, University of Hanoi.
(Vietnam, North--Chiggers (Mites))

DARSKAYA, N.F.; GROKHOVSKAYA, I.M.; KOSHKIN, S.M.; KULAKOVA, Z.G.; SLONOV, M.N.

Geographical distribution of some species of fleas originally described as being from North Korea. Trudy Nauch.-issl. protivochum. inst. Kav. i Zakav. no.5:176-183 '61. (MIRA 17:1)

1. Nauchno-issledovatel'skiy protivochumnyy institut Kavkaza i Zakavkaz'ya, Institut epidemiologii i mikrobiologii AMN SSSR, Protivochumnoye otdeleniye porta Vanino i Institut meditsinskoy parazitologii i tropicheskoy meditsiny.

BREGETOVA, N.G.; GROKHOVSKAYA, I.M.

A new genus and new species of gamasid mites from North Vietnam and South China. Ent. oboz. 40 no.1:225-232 '61. (MIRA 14:4)

1. Zoologicheskiy institut AN SSSR, Leningrad i Institut epidemiologii i mikrobiologii Akademii meditsinskikh nauk SSSR, Moskva.
(Vietnam, North--Mites) (Yunnan Province--Mites)

SHLUGER, Ye.G.; GROKHOVSKAYA, I.M.; DAN VAN NGY; NGUYEN SON KHOE;
DO KIN TUNG

Trombiculid mites of the genera Dolosisia Oudemans, 1960 and Traubacarus Audy et Nadchatram, 1957 (Acariformes, Trombiculidae) from North Vietnam. Ent. oboz. 40 no.2:448-453 '61. (MIRA 14:6)

1. Otdel infektsiy s prirodnoy ochagovost'yu Instituta epidemiologii imeni N.F. Gamaleya Akademii meditsinskikh nauk SSSR Moskva i Kafedra parazitologii Khanoyskogo universiteta, Khanoy, Vyetnam.
(Vietnam, North--Chiggers(Mites))

GROKHOVSKAYA, I.M.; DAN VAN NGY; DAO VAN T'YEN; NGUYEN SUAN KHOE; LO KIN TUNG; TO KIM TAN'

Gamasid mites of North Vietnam. Report No.1. Zool. zhur. 40 no.10:1565-1568 O '61. (MIRA 14:9)

1. Institute of Epidemiology and Microbiology, U.S.S.R. Academy of Sciences, Moscow and The University of Democratic Republic of Viet-Nam, Hanoi.

(Vietnam, North--Mites)

GROKHOVSKAYA, I.M.; NGUYEN-SUAN-KHOE

Gamasid mites of North Vietnam. Report No.2. Zool. zhur. 40 no.11: 1633-1646 N '61. (MIRA 14:11)

1. Institute of Epidemiology and Microbiology, U.S.S.R. Academy of Medical Sciences, Moscow and the University of Hanoi, People's Democratic Republic of Viet-Nam.
(Vietnam, North--Mites)

GROKHOVSKAYA, I.M.; KHUDYAKOV, I.S.

Report of finding the tick Haemaphysalis flava Neumann (1897) in the southern part of the Maritime Territory. Trudy VladIEMG no.2:105-106 '62. (MIRA 18:3)

1. Iz otdela infektsiy s prirodnoy ochagovost'yu Instituta eksperimental'noy meditsiny Akademii meditsinskikh nauk SSSR im. N.F. Gamaleya. Zaveduyushchiy otdelom - prof. P.A. Petrishcheva.

SHLUGER, Ye.G.; GROKHOVSKAYA, I.M.; DAN VAN NGY; NGUYEN SON KHOE; DO KIN TUNG

Harvest mites of the genus Trombicula (Acariformes, Trombiculidae) from the Democratic Republic of Vietnam. Ent. oboz. 42 no.3:691-701 '63. (MIRA 17:1)

1. Otdel infektsiy s prirodnoy ochagovost'yu Instituta epidemiologii i mikrobiologii AMN SSSR, Moskva i kafedry parazitologii Khanoyskogo universiteta, Khanoy, V'yetnam.

[illegible], I.[illegible].; [illegible], [illegible]; [illegible]

Is Rickettsia sibirica [illegible] [illegible] animals? Med. paraz. i paraz. [illegible] Mr-Ap '64 ([illegible])

1. Otdel infektsiy s prir[illegible] (zav.- prof. P.A. Petrishcheva) Instituta [illegible] imeni N.F. Gamalei (direktor - prof. [illegible]).

SIDOROV, V.Ye.; GROKHOVSKAYA, I.M.

Effect of X rays on the sexually mature tick Hyalomma asiaticum. Report No. 1. Med. paraz. i paraz. bol. 33 no.5:560-563 S-O '64. (MIRA 18:4)

1. Otdel infektsiy s prirodnoy ochagovost'yu Instituta epidemiologii i mikrobiologii imeni Gamalei AMN SSSR.

S F'YANOVA, V.M.; GROKHOVSKAYA, I.M.; NGUYEN SUAN KHOE

Study on the larvae of bloodsucking mosquitces (Culicinae) in North Vietnam. Zool. zhur. 43 no.8:1173-1181 '64. (MIRA 17:11)

1. Otdel bolezney s prirodnoy ochagovost'yu Instituta epidemiologii i mikrobiologii AMN SSSR, Moskva.

GROKHOVSKAYA, I.M.; GIBET, L.A.; KHUDYAKOV, I.S.

Chigger mites (Trombiculinae) in the southern Maritime Territory. Zool. zhur. 43 no.10:1446-1453 '64.
(MIRA 17:12)

1. Department of the Infections of Natural Nidality, Institute of Epidemiology and Microbiology, Academy of Medical Sciences of the U.S.S.R. (Moscow).

ACC NR: AP6021891 (A, N) SOURCE CODE: UR/0358/66/035/003/0299/0304

AUTHOR: Grokhovskaya, I. M.; Ignatovich, V. F.; Sidorov, V. Ye.

ORG: Institute of Epidemiology and Microbiology, im. N. F. Gamalei, AMN SSSR (Institut epidemiologii i mikrobiologii AMN SSSR

TITLE: Susceptibility of Ixodes ticks to Rickettsia prowazeki

SOURCE: Meditsinskaya parazitologiya i parazitarnyye bolezni, v. 35, no. 3, 1966, 299-304

TOPIC TAGS: human disease, animal disease, disease vector, rickettsia, ticks, Rickettsia prowazeki, experimental infection

ABSTRACT:
Ticks were infected with *Rickettsia prowazeki* by injection or by feeding on infected guinea pigs. Some tick species were more susceptible than others. *Rickettsia* remained in the bodies of ticks infected during feeding for 15 days. *Rickettsia* were found up to 116 days later in ticks infected parenterally, showing that the tick's body provided a favorable environment for growth of *Rickettsia*. Ovarian transmission to progeny did not occur. Infected ticks did not infect healthy guinea pigs by feeding on them, but the guinea pigs could be infected by vaccination with ground tick bodies. Orig. art. has: 3 tables and 1 figure. [W.A.-50; CBE No. 10]

SUB CODE: 06/ SUBM DATE: 10Aug65/ ORIG REF: 004/ OTH REF: 003/
UDC: 576.895.42:576.851.71+591.67-542:576.851.71

Card 1/1

ACC NR: AP6020692 SOURCE CODE: UR/0016/66/000/006/0133/0138

AUTHOR: Grokhovskaya, I. M.; Sidorov, V. Ye.

ORG: Institute of Epidemiology and Microbiology, Academy of Medical Sciences, SSSR, Moscow (Institut epidemiologii i mikrobiologii im. Gamaleya AMN SSSR)

TITLE: Mutual adaptation of causative agents and vectors

SOURCE: Zh mikrobiol, epidemiol i immunobiol, no. 6, 1966, 133-138

TOPIC TAGS: animal disease, tick borne typhus, adaptation, rickettsia, medical experiment, tick, vector, experimental infection, pathogen, rickettsial disease, animal parasite

ABSTRACT:
Ornithodoros lahorensis ticks were infected with the tick-borne typhus pathogen *Dermacentroxenus sibiricus* by feeding on infected guinea pigs and by introducing the rickettsia directly into the body cavity. The ticks infected by feeding retained the pathogen for 420 days, and the parenterally infected ticks for 300 days (to the end of the observation period). The infected ticks retained the rickettsia through the subsequent stages of metamorphosis and transmitted them by ovum to their progeny.

Card 1/2 UDC: 616.981.711-036.21-022.39:576.895.42+576.895.45.095.38

ACC NR: AP6020692

Parentally infected ticks transmitted the rickettsia to uninfected laboratory hosts (guinea pigs and rabbits) by feeding. The rickettsia were seen in the amebocytes of tick hemolymph by the 4th to 10th day after parenteral infection. *Dermacentroxenus sibiricus* can be transmitted directly from infected to uninfected ticks by parenteral injection of tracheal matter from the infected ticks. [WA-50; CBE No. 11]

SUB CODE: 06/ SUBM DATE: 22Jun65/ ORIG REF: 007/ OTH REF: 001/

Card 2/2

2A

28

Importance of time element and amount of CO_2 in the carbonation gas upon the purification of juices. G. S. Avramenko and A. A. Grokhovskii. *Nauch. Zapiski Sakharnoi Prom.* 12, No. 3-4, 270-5(1935). —A. and G. found that by decreasing CO_2 in the gas the rate of filtration and purity were lowered, while the color and Ca salts increased. V. E. Baikow

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

Experiment on concentration of final molasses and mixing it with freshly boiled raw sugar massecuites. G. D. Avramenko and A. A. Grokhovskii. *Nauch. Zapiski Sakharnoi Prom.* 12, Tech. Ser. No. 5-6, 408-13 (1935).—Concn. of a final molasses to 90 Brix and mixing it with second-strike massecuite in crystallizers decreases the purity of the molasses by 2 units. The quality of the second sugar is not worse and the purging is not more difficult. V. E. Baikow

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

166T106

GRODZOVSKIY, G. L.

USSR/Physics - Turbulence
Ballistics

Jul/Aug 50

"Solving the Axisymmetrical Problems of the Free Turbulence in the Theory of Turbulent Diffusion," G. L. Grodzovskiy, Moscow

"Priklad Matemat i Mekh" Vol XIV, No 4, pp 437-440

Solves problems on (a) propagation of an axisymmetrical turbulent jet of an incompressible gas in a submerged space, and (b) turbulent trace behind a body of rotation according to theory of turbulent diffusion. Submitted 18 Jan 50.

166T106

[redacted]

GRODZOVSKII, G.L.

2

798. Grodzovskii, G. L., and Kuznetsov, Yu. E., Gas-flow vortex-cooling-chamber theory (in Russian), *Izv. Akad. Nauk SSSR Otd. tekh. Nauk* no. 10, 112-118, Oct. 1954.

Ideally analytical study of solid body motions of a compressible gas in so-called "vortex cooling tube." Pressure, density, and temperature distribution as a function of the radial distance are calculated for the adiabatic case. Difference of the viscous layers in the neighborhood of the cylindrical walls is found to be significant but is not accounted for in the calculations. Method of improving efficiencies of the vortex tube is discussed.

V. Korolenko, USA

Phys

GRODZOVSKIY, G.L.

USSR

A.7-163 551.511:533.17

Grodzovskii, G. L., **Vyravnivanie neravnomernosti polia skorostei v osesimmetrichnom turbulentnom i laminarnom potoke.** [Smoothing out the inequalities of the velocity field in axially symmetrical turbulent and laminar flow.] *Akademiia Nauk SSSR, Doklady,* 97(4):613-616, Aug. 1, 1954. 3 figs., 4 refs., 10 eqs. DLC—It is demonstrated that in axially symmetrical turbulent flow the unevenness of the longitudinal velocity is smoothed out as inversely proportional to the distance along the axis of symmetry and that the profile of velocity is determined by the Bessel function J_0 and the maximum unevenness is near the axis of flow. Both in laminar and axially symmetrical flow the intensity of the smoothing out of the velocity field is practically the same. The equations for the velocity profile of laminar axially symmetrical flow as well as for turbulent flow are given. *Subject Headings:* 1. Turbulent flow 2. Laminar flow.—*I.L.D.*

62

USSR/Engineering - Aerodynamics, optical method FD-3233

Card 1/1 Pub. 41-14/22

Author : Grodzovskiy, G. L., Moscow

Title : Characteristics of Unilateral optical Devices for the Investigation of Gas Flow and Deformations of Plane Surfaces

Periodical : Izv. AN SSSR, Otd. Tekh. Nauk 7, 119-121, Jul 55

Abstract : Describes, for use in photographing a gas flow, an improved and simplified Foucault-Toepler optical device in which a beam of light, twice intercepted by a knife edge, simulates an optical slit. Explains an optical arrangement for studying gas flow and surface deformations thru color photography, including a grating system for quantitative measurements. Three diagrams; nine photographs. Eight references, four USSR.

Institution :

Submitted : 14 April 1955

USSR/Physics - Hydrodynamics

FD-1439

Card 1/1 : Pub. 85 - 8/15

Author : Grodzovskiy, G. L. (Zhukovskiy)

Title : Flow of a viscous gas between two moving parallel flat walls and between two rotating cylinders

Periodical : Prikl. mat. i mekh. 19, No 1, 99-102, Jan-Feb 1955

Abstract : The author generalizes the problem of the flow of a viscous incompressible fluid between two moving flat walls and between two rotating cylinders (N. Ye. Kochin, I. A. Kibel', N. V. Roze, Teoreticheskaya gidromekhanika, part II, 1948; S. M. Targ, Osnovnyye zadachi teorii laminarnykh techeniy [Principal problems of the theory of laminar currents], 1951) to the case of a compressible viscous gas.

Institution :

Submitted : September 27, 1954

GRODZOVSKIJ, G.L.

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1858
AUTHOR GRODZOVSKIJ,G.L.
TITLE The Automodellike Motion of a Gas on the occasion of a Vehement Peripheral Explosion.
PERIODICAL Dokl.Akad.Nauk,111, fasc.5, 969-971 (1956)
Issued: 1 / 1957

Like the explosion in the symmetry center of a gas at rest, which was investigated by L.I.SEDOV (Prikl.matem.i mech.,10, fasc.2 (1946)), also the automodellike motion on the occasion of a vehement peripheral explosion can be investigated. Such a peripheral explosion causes a strong shock wave to move towards the symmetry center of the resting gas (density ϱ_1). The pressure p_1 of the resting gas is assumed to be negligibly low compared to the pressure p_2 behind the shock wave. If E is the characteristic energy of the explosion, the only dimensionless variable combination of the parameters is $\lambda = (E/\varrho_1)(t^2/r^{2+\nu})$. Here r denotes the linear coordinate, t - time, and it holds that $\nu = 1,2$ and 3 for a plane, cylindrical and spherical flow respectively. On this occasion the amount of energy enclosed between the surfaces λ = const is constant. To the position r_2 of the shock wave there corresponds a certain constant value of the parameter: $\lambda_2 = (E/\varrho_1)t^2/r_2^{2+\nu}$. Accordingly, the propagation velocity c of the shock wave is:
$c = 2\sqrt{\lambda_2\varrho_1/E}/(2+\nu)\, r_2^{\nu/2} = (2/(2+\nu))\, r_2/t$. The motion of the shock wave

Dokl.Akad.Nauk,111,fasc.5,969-971 (1956) CARD 2 / 2 PA - 1858

towards the symmetry center of the resting gas ($c > 0$) corresponds to a domain with the modification of t from $-\infty$ to 0. When approaching the center, the velocity of the shock wave increases sharply, and accordingly also the pressure p_2, the velocity v_2, and the gas temperature T_2 behind the front of the shock wave will grow too: $p_2 = (2/(\varkappa+1))\varrho_1 c^2$; $v_2 = (2/(\varkappa+1))c$; $\varrho_2 = \varrho_1(\varkappa+1)/(\varkappa-1)$, i.e. it is true that $T_2 \sim 1/r_2{}^{\nu}$. - The flow of the gas behind the shock wave is described by the aforementioned solution by L.I.SEDOV. The integral curve in the V,z plane is given ($v = rV/t$; $\varrho = \varrho_1 R$; $p = z = \varkappa p/R$). To the here investigated current there corresponds the portion of the integral curve between (V_2, z_2) and $((2/(2+\nu)),0)$. The same formulae are used in this case for computation as in the case of the aforementioned work by SEDOV. - Three diagrams illustrate the results of the computation of the velocity-, density-, pressure-, and temperature profiles for the plane, cylindrical, and spherical case at $\varkappa = 1{,}4$. The domain of the automodellike motion is between the shock wave and an exterior boundary with the radius r_K. On the exterior boundary r_K the flow velocity of the gas and the motion velocity of the boundary are identical. Such a flow is e.g. obtained on the occasion of the contraction of a hollow piston in the direction towards the center. The here investigated cylindrical flow is suited for the determination of the steady flow round a correspondingly thin rotational body at high supersonic velocities.

INSTITUTION: Central Aero-Hydronamic Institute "N.E.ZUKOVSKIJ".

AUTHOR: Grodzovskiy, G.L. (Moscow).

24-6-13/24

TITLE: Some properties of the flow around bodies at high supersonic speeds. (Nekotorye osobennosti obtekaniya tel pri bol'shikh sverkhzvukovykh skorostyakh).

PERIODICAL: "Izvestiya Akademii Nauk, Otdeleniye Tekhnicheskikh Nauk" (Bulletin of the Ac.Sc., Technical Sciences Section), 1957, No.6, pp.86-92 (U.S.S.R.)

ABSTRACT: At high supersonic speeds the shock drag coefficient is entirely determined by the nose portion of the body. Reference is made to previous work wherein the levelling out of the shock drag coefficient at high supersonic speeds was recognised. Based on the similarity laws previously discovered, simple formulae are derived (equations 8 and 9) for the pressure distribution over the surface of the body in terms of the angle of rotation of the flow in the shock wave. In Figs.2, 3 and 4 pressure distributions so derived are compared with values computed by the method of characteristics for a bi-convex profile and with the test results in the nose portion of a solid of revolution. These results show that at high supersonic speeds the relative pressure over the profile is, in the first approximation, proportional to the square of the sine of the

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24-6-13/24

Some properties of the flow around bodies at high supersonic speeds. (Cont.)

angle of slope of the profile. This property makes it possible to obtain analytical expressions for the aerodynamic coefficients. Several variational problems are considered. In plane flow, the shape of a body with the minimum frontal drag for a given length is found to be a wedge. The shape of a profile with a minimum shock drag for a given moment of resistance to bending is expressed in eq.(15). In axially symmetrical flow, the minimum drag shape is given by eq.(17). Its drag is 0.844 times the drag of a cone. When friction is taken into account, eq.(20) gives the optimum shape. The flow about a body whose profile is described by the 0.75 power of the chordal coordinate is examined. Such a body has a shock drag 27% lower than the equivalent cone. There are 7 graphs and 15 references, 8 of which are Slavic.

SUBMITTED: April 16, 1956.

AVAILABLE:

Card 2/2

AUTHOR: Grodzovskiy, G. L. (Moscow) SOV/24-58-8-24/37

TITLE: Some Exact Solutions for Problems of Gas Flow in a Pipe Taking Account of Friction and Convective Heat Exchange (Nekotoryye tochnyye resheniya zadachi o techenii gaza v trube s uchetom treniya i konvektivnogo teploobmena)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 8, pp 127-129 (USSR)

ABSTRACT: This problem has been investigated by Millionshchikov and Khristianovich (Ref 1), Romanenko (Ref 2) and others. The problem of such a uniform stationary flow of a viscous gas using the known hydrodynamic theory of heat transfer leads to a differential equation for which a number of numerical and approximate analytical solutions can be obtained. One exact solution in general form of this problem is known, namely, that given by Dvornichenko (Ref 3) for the case of a constant temperature head. The present paper considers a class of exact solutions of this problem in the general form embracing a wide range of parameters. The results can be used, for example, to calculate the flow of gas in a pipe having an arbitrary temperature distribution along its wall. This is achieved by dividing

Card 1/2

SOV/24-58-8-24/37

Some Exact Solutions for Problems of Gas Flow in a Pipe Taking Account of Friction and Convective Heat Exchange

the pipe into sections in each of which a given temperature distribution is replaced by one which is near to one of the exact solutions.
There are 3 figures and 4 references, 3 of which are Soviet and one English.

SUBMITTED: March 6, 1958

1. Gas flow--Mathematical analysis 2. Gas flow--Heat transfer
3. Gas flow--Friction 4. Pipes--Properties

Card 2/2

SOV/179-59-1-31/36

AUTHOR: Grodzovskiy, G. L. (Moscow)

TITLE: Efficiency Interference of the Wing and Fuselage at Supersonic Speed (Poleznaya interferentsiya kryla i fyuzelyazha pri giperzvukovykh skorostyakh)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1959, Nr 1, pp 170-173 (USSR)

ABSTRACT: A non-linear theory of a "wing-body" interference in a supersonic flight is described. A conical shape of a fuselage with a triangular wing (Fig.1, a), a semi-conical fuselage with a triangular wing (Fig.1, b) and a split-type fuselage with a similar wing (Fig.1v) are considered. The calculations are based on Refs.1-13 with the following amendments: the geometric relationship of the conical fuselage (angle 2ω) is shown in Fig.1,a where:

$$\varepsilon = \frac{\varkappa + 1}{2} \omega , \quad \alpha = \omega \sqrt{\varkappa \frac{\varkappa - 1}{2}} .$$

Card 1/4

Efficiency Interference of the Wing and Fuselage at Supersonic Speed

The pressure affecting the sides of the fuselage and the lower surface of the wing is :

$$\bar{p} = \frac{p - p_H}{1/2\ \varkappa M^2 p} = (\varkappa + 1)\omega^2 ,$$

the pressure on the other surfaces is equal to zero. The coefficient of lifting force of the triangular wing (surface OAB) is:

$$c_y = (\varkappa + 1)\omega^2$$

$$K = \frac{C_y}{C_x} = \sqrt{\frac{(\varkappa + 1)\ (\varkappa - 1)}{2\varkappa C_y}} .$$

In the case of the arrow-shaped wing OACB (Fig.1,a) the pressure on the lower surface will be:

$$\bar{p} = C_y = (\varkappa + 1)\ \omega^2 .$$

In the cases shown in Fig.1bv, the front edge of the wing $OB - R_2 = cx^m$ corresponds to the edge $OA - r_T = \bar{r}_T cx^m$.

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00051701(

The results of calculations are illustrated in Fig.2, where the profiles of the relative pressure $\bar{p}_2$ and density $\bar{\rho}_2$ in the supersonic flow $\bar{r} = \overline{cx}^m$ ($\varkappa = 1.4$) are shown. From the data in Fig.2a it is possible to determine the distribution of pressure on the lower surface of the wing, using the formula:

$$\bar{p} = \frac{4\bar{p}_2}{\varkappa + 1}\left(\frac{dr_2}{dx}\right)^2 .$$

The table on p 172 shows the values of $K\sqrt{C_y}$ and $K/\bar{L}$ for the various values of m (the last column is given for the conical fuselage with a triangular wing). It can be seen from the table that there is a much closer connection between the conical fuselage and its wings at the supersonic speed than was considered for the linear solutions in Refs.2 to 4. This new deduction is connected with the characteristic

SOV/179-59-1-31/36

Efficiency Interference of the Wing and Fuselage at Supersonic Speed

distribution of pressure at supersonic speeds as shown in Fig.3 (a - conical, b - semicircular fuselage). There are 3 figures, 1 table and 13 references; 6 of the references are English, 1 Italian, 1 German and 5 Soviet.

SUBMITTED: May 28, 1958.

Card 4/4

GROZDOVSKIY, G.L. (Moskva)

Useful interference of wings and fuselage at hypersonic speeds.
Izv.AN SSSR.Otd.tekh.nauk.Mekh. i mashinostr. no.2:170-173
Ja-F '59. (MIRA 12:5)
(Aerodynamics, Supersonic)

GRODZOVSKIY, G.L. (Moskva); DYUKALOV, A.N. (Moskva); TOKAREV, V.V. (Moskva); TOLSTYKH, A.I. (Moskva)

Self-simulating gas motions with shock waves propagating with a constant speed in a motionless gas. Prikl. mat. i mekh. 23 no.1: 198-200 Ja-F '59. (MIRA 12:2)
(Aerodynamics, Supersonic)

GROZDOVSKIY, G. L. (Moscow)

"Electrical current in an Axisymmetric meridian Flow Field of a conducting fluid;*

"Supersonic Flow with a Subsonic Axial Component Past a Plane Cascade and a Perforated Wall."

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

*smoothing of parameters in viscous helical flows." with Dyukalov, A.N., Tokarev, V. V., Tolstykh, A. I.

GROZDOVSKIY, G. L., KRASHENNIKOVA, N. L. (Moscow)

"Self-Similar Solutions of a Gas Motion with Shock Waves Propagating According to a Power Law in a Gas at Rest."

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

GROZDOVSKIY, G. L. , KRASHENINNIKOVA, N. L.

"The Problem of the Unsteady Motion of the Piston and Possible Applications of this Problem to the Hypersonic Flow Past an n-Power Body of Revolution."

report to be submitted for the Intl. Council of the Aeronautical Sciences, Second International Congress, Zurich, Switzerland, 12-16 Sep 60.

GRODZOVSKIY, G. L. and KRASHENINNIKOVA, N. L. - USSR Academy of Sciences, Leningrad Road 7. Moscow D-40-USSR.

"The Problem of the Unsteady Motion of the Piston and Possible Applications of This Problem to the Hypersonic Flow Past N = Power Body of Revolution."

report submitted for the 10th Intl. Congress of Applied Mechanics, Stresa, Italy, 31 Aug-7 Sep 1960.

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S/179/60/000/01/006/034
E031/E535

AUTHORS: Grodzovskiy, G.L., Dyukalov, A.N., Tokarev, V.V. and Tolstykh, A.I. (Moscow)

TITLE: The Axisymmetric Meridianal Flow of a Conducting Fluid. Equalization of the Parameters of the Rotational Flow of a Viscous Fluid

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1960, Nr 1, pp 41-46 (USSR)

ABSTRACT: The electrodynamic equations of magnetohydrodynamics and the equation for the current density j are simplified by the assumption that the velocity and current density components v_θ and j_θ are zero, (a cylindrical coordinate system, r, θ, x is used). For meridianal flow of an incompressible conducting fluid at constant velocity $v_x = v_o$, $H_r = H_o$, and a further simplification can be made. A solution for H_θ is sought in separable form as $X(x)R(r)$. To this solution a linear term in the radius is added to satisfy the equations of motion. Boundary conditions are derived by assuming that the cylinder which bounds the fluid is non-conducting. Similarly to the known exact

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The Axisymmetric Meridianal Flow of a Conducting Fluid. Equalization of the Parameters of the Rotational Flow of a Viscous Fluid

solution of the flow of a viscous incompressible fluid it is shown that in the case of the meridianal flow of an incompressible conducting fluid the equations of magnetohydrodynamics permit of a class of "automodel" solutions (dimensional analysis is invoked). The velocity and field components and the pressure are expressed in terms of the non-dimensional parameter $\zeta = x/r$ and the functions of this parameter which occur are determined by the solution of four ordinary differential equations. These equations are solved by introducing a function related to the stream function. The direction of the current along rays passing through the origin is a characteristic of the flows under discussion. Two examples are discussed. One is a conical charge in an unbounded medium. The other is a charge in a conical channel with non-conducting walls. Finally the similarity of the above problem with that of the axisymmetric flow of a viscous fluid moving with constant velocity inside a

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The Axisymmetric Meridianal Flow of a Conducting Fluid. Equalization of the Parameters of the Rotational Flow of a Viscous Fluid

cylinder in the absence of friction at the walls is discussed.
There are 3 figures and 6 Soviet references.

SUBMITTED: April 14, 1959

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DZ

a. [illegible] - V. [illegible]

b. [illegible] Carried out from [illegible] - [illegible], [illegible],
[illegible], Tyurulna, L. C., I. V. [illegible]

c. [illegible] Reactions to Space Flight Conditions -
G. G. [illegible], V. V. [illegible]

d. On the [illegible] of the [illegible] of the Variable [illegible] the Constant [illegible]
[illegible] in the Gravitational Field - G. L. GROZDOVSKIY, Y. N. [illegible],
V. V. [illegible]

e. On [illegible] Solar Corpuscles - V. I. [illegible]

f. Optical [illegible] Cooled by Radiation - G. L. [illegible]

g. Investigation of [illegible] and Elementary [illegible] by Means
of Charged Particle [illegible] on Space Rockets - N. L. [illegible]

h. Rocket and Satellite Meteoric Dust Investigations - T. N. [illegible]

i. On [illegible] of Cosmic Radiation on [illegible] - S. N. Vernov,
Y. E. [illegible], N. F. [illegible], I. A. [illegible] V. I. [illegible] - [illegible]

reports to be presented at the XIIth International Astronautical Congress,
Washington D. C. 1-7 October 1961

[illegible]

27647

S/024/61/000/004/005/025
E191/E581

26.2114

AUTHOR: Grodzovskiy, G.L. (Moscow)

TITLE: Experimental investigation of the interaction between compression shocks and the boundary layer in the range of Mach numbers between 1.0 and 1.8

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk. Energetika i avtomatika, 1961, No.4, pp.20-31 + 2 plates

TEXT: In many types of supersonic flow, an interaction between compression shocks and the boundary layer takes place. Typical cases of flow with and without separation of the boundary layer are illustrated in principle including flow past a re-entrant angle, the reflection of an oblique shock from a wall, outflow from a nozzle or a diffusor and flow past an aerofoil. Separation depends upon the intensity of the compression shock and the initial velocity profile in the boundary layer. In the case of a turbulent boundary layer over a flat plate, the velocity profile is independent of the Reynolds number, at least between 0.78 and 50.0 millions. Downstream of a compression shock, substantial transverse pressure gradients can exist at the outer limit of the

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Experimental investigation of ... S/024/61/000/004/005/025
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boundary layer. However, very near the wall, where the separation begins, it is always possible to select a region in which the transverse pressure gradients are substant lly smaller than the longitudinal pressure gradients. The sepa tion point is defined by a longitudinal pressure gradient obeying a relationship which contains also the velocity and static pressure in the undisturbed flow, the thickness of the boundary layer a the point of separation, the ratio of specific heats and an ex rimental constant. Experiments show that in the interaction of ompression shocks and the boundary layer, the rise of pressure along the wall proceeds over a certain length. It is shown that th ratio of this length to the thickness of the boundary layer at the point of separation can only depend on the shape of the initial velocity profile in the boundary layer of the plate and thus is independent of the Reynolds number. Therefore, the separation of a turbulent boundary layer from a flat plate is mainly dependent on the pressure ratio across the compression shock. This critica pressure ratio depends mainly on the Mach number of the flow and h been thoroughly examined by previous investigators for the ge of Mach numbers above 2.0. Extrapolation into a range of ller Mach numbers

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proved to be in conflict with existing individual measurements. The present paper is devoted to an experimental study of the critical pressure ratio in the Mach number range between 1.0 and 1.8 (local value upstream of any compression shock). Experiments with a flat plate were carried out in an installation with the rectangular working portion of 90 x 120 mm cross-section, in which a flat plate of 320 mm length and 90 mm width was set up. An additional wedge was placed above the plate to produce a system of compression shocks. Adjustment of the setting angle of the wedge controlled the intensity of the system of oblique shocks. The static pressure distribution was measured at the plate surface by a series of holes. The two side walls of the rectangular working section were made of a flat mirror and of optical glass, respectively. The optical spectra of the flow were photographed and examples are reproduced. To detect the boundary layer, a T-shaped microprobe of 0.5 mm diameter and 5 mm length was placed on the plate surface. The holes in the probe were 0.25 mm above the plate face. The pressure drop measured by the probe indicates the flow direction near the plate. The separation point occurs where the pressure drop is zero. The

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results of the measurements are plotted in the form of the critical pressure ratio against the Mach number. Measurements were also carried out with axially symmetrical nozzles operating at pressure drops different from the design value. A conical compression shock forms at the opening of the nozzle. Since the pressure gradient near the opening is small, conditions are similar to those over a flat plate. When the shock reaches a high intensity, a flow separation can take place. A study was made of the effect of the Reynolds number by varying the static pressure behind the nozzle. The effect was negligible. The existence of a turbulent boundary layer was proved by measurement of the velocity profile. Throughout most of the examined range of Mach numbers the critical pressure ratio varied between 1.6 and 1.75. Below a Mach number of 1.25 even a straight compression shock has a pressure ratio under 1.6 so that the flow always remains without separation. These results, obtained for the region of interaction between the shock wave and the boundary layer where the pressure gradient is zero, can be used in the analysis of supersonic flows with small pressure gradients such as the flow in nozzles, the flow past profiles, the flow in an oblique nozzle opening and

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00051701(

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others. Positive pressure gradients promote (and negative gradients retard) the beginning of separation. In nozzle flow, the results obtained in the present paper yield that pressure drop through the nozzle beyond which the flow remains without separation. It is pointed out that, at a pressure drop below the design value, flow separation increases the thrust of a reaction nozzle so that separation can become a favourable factor. The conditions of separation in flow past an aerofoil section are discussed. The largest incidence without separation is reached by a section with a flat upper surface. Among the symmetrical profiles which have a lower wave drag than non-symmetrical profiles, the rhomboid reaches the largest incidences without separation. Segmental profiles of 9% thickness have no range of incidences without separation. The flow in the oblique cross-section of a cascade of blades (for example, the outlet annulus in a turbine stator) is examined. Features of the blade profiles can be chosen, which ensure flow without separation at supersonic outlet velocities. The main parameter is the angle between the direction of the outer velocity and the tangent to the back of the profile at the outlet cross-section. This angle should be as near zero as possible to ensure lack of separation, a narrow

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wake and therefore low total pressure losses. G. I. Petrov, V. Ya. Likhushin, L. I. Sorkin and I.P. Nekrasov are mentioned in the paper. There are 15 figures and 3 references: 2 Soviet and 1 non-Soviet.

SUBMITTED: May 10, 1961

Card 6/6

21963
S/020/61/137/005/011/026
B104/B214

3.9200 (1062,1080,1132)

AUTHORS: Grodzovskiy, G. L., Ivanov, Yu. N., and Tokarev, V. V.

TITLE: Motion of a body with variable mass and constant power consumption in a gravitational field

PERIODICAL: Doklady Akademii nauk SSSR, v. 137, no. 5, 1961, 1082-1085

TEXT: The present paper gives a study of the general case of the optimization of the reactive motion of a body with variable mass in a gravitational field of two centers when the power consumption is constant. For a given trajectory, the acceleration is equal to $a(t) = -Vdm/mdt$, where V is the escape velocity. The utilizable reactive power may be written as $N = -dmV^2/2dt$. Thus, $a^2/2N = -dm/m^2dt$. This gives by integration the weight of the body as a function of time: $G = G_o\left(1 + \int_o^T \frac{G_o}{2Ng} a^2 dt\right)$. The specific weight of the power source is defined as: $\alpha = G_N/N$, and the

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relative total weight initially is given by $\bar{G} = (G_M + G_N)/G_o$

$$= \alpha|N/G_o + 1 - 1 - 1|\left(1 + \int_0^T \frac{G_o}{2Ng} a^2 dt\right).$$ For a given a(t) the quantity $\bar{G}$

has a minimum: $\bar{G}_{min} = 2\sqrt{\varphi} - \varphi$ at $(G_N/G_o)_{opt} = (\alpha N/G_o)_{opt} = \sqrt{\varphi} - \varphi$,

where $\varphi = \frac{\alpha}{2g}\int_0^T a^2 dt$. In the case of a step by step decrease of power related to a decrease in weight, the maximum relative utilizable weight may be calculated from the formula

$$\bar{G}_{n.\,макс} = (1 + \Phi_1 - 2\sqrt{\Phi_1})\prod_{i=2}^{n}\left(\frac{1-\Phi_i}{1+\Phi_i}\right)^2 \quad (4).$$

Here, $\sum \varphi_i = \varphi$ is given. The optimum ratio between the φ_i may be

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B104/B214

Motion of a body with variable ...

obtained from (4) by differentiation. Fig. 1 graphically shows $\bar{G}_{min}$ and $\bar{G}_{K}/G_0$ as functions of ξ. As is seen from this graph, a minimum of $\bar{G}$ requires a minimum of the integral $\int_0^T a^2 dt$. As an illustration, the motion in a plane spiral is studied in the case of small accelerations. The result obtained is: $r/R_0 = 1/\left(1 - \int_0^t k(t)dt/\frac{R_0}{v_0}\right)^2$. The next topic studied is the optimum displacement of a body of variable mass in the time T between two given points. This problem leads to a variation problem for the integral $I = \int_0^T a^2(t)dt$. Here, the plane motion in the gravitational field of two centers is investigated, one of which is at rest and the other

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moves with constant angular velocity ω on a circle of radius r_0 about this center. In order to study the motion of the body in a region in which one of the two centers has a dominating effect on the motion of the body, it is convenient to place the reference system in this center. On these assumptions, the integral of the variation problem introduced above yields the integral

$$I = \int_0^T \left\{\left[\ddot{r}_l - r_l(\dot{\psi}_l + \omega)^2 + \frac{k_l}{r_l^2} - \mathfrak{R}_l\right]^2 + [r_l\ddot{\psi}_l + 2\dot{r}_l(\dot{\psi}_l + \omega)\Psi_l]^2\right\} dt. \quad (9)$$

Euler's equations of this variation problem are:

$$\dot{a}_{r_l} = \frac{1}{v_{r_l}}\left[\frac{a_{r_l}^2 + a_{\psi_l}^2}{2} + a_{r_l}\left(\frac{v_{\psi_l}^2}{r_l} - \frac{k_l}{r_l^2}\right)^{\cdot} - \lambda_l - \nu_l\frac{v_{\psi_l}}{r_l}\right], \quad (10)$$

$$\dot{a}_{\psi_l} = -\frac{1}{r_l}(a_{\psi_l}v_{r_l} - 2a_{r_l}v_{\psi_l} + \nu_l); \quad (11)$$

$$\dot{\nu}_l = a_{\psi_l}\Psi'_{l\psi_l} + a_{r_l}\mathfrak{R}'_l\psi_l; \quad (12)$$

$$\dot{\lambda}_l = -v_{r_l}\left(a_{\psi_l}\Psi'_{lr_l} + a_{r_l}\mathfrak{R}'_{lr_l} + \frac{\Psi_l}{r_l}a_{\psi_l}\right) - \nu_l\frac{\Psi_l}{r_l} - \dot{a}_{r_l}\mathfrak{R}_l - \frac{v_{\psi_l}}{r_l}(\nu_l - 2a_{r_l}\Psi_l);$$

$$v_{r_l} = \dot{r}_l, \quad v_{\psi l} = r_l(\dot{\psi}_l + \omega). \qquad (14)$$

The problem is simplified and limited to the following variation problem: It is desired to find a trajectory which gives a minimum for $\int_{r_1}^{r_2} a^2 dr/v_r$ under the additional isoperimetric condition. The time for the displacement from r_1 to r_2 $\left(T = \int_{r_1}^{r_2} dr/v_r\right)$ and the polar angle of the displacement $\Delta\psi = \int_{r_1}^{r_2} v_\psi dr/rdr$ are given. With their help, expressions can be found for $\dot{a}_r$ and $\dot{a}$ which agree with (10) and (11) for $\varkappa = 2\lambda$, and $\varkappa_2 = 2\nu$. It is shown that in the case of the free fall along the optimum trajectory the acceleration varies linearly with time. Finally, the singularities of the system are also studied. There are 2 figures and 2 references: 1 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: J. H. Irving, E. K. Blum, Vistas in Astronautics, 2, Second Annual Astronautics Symposium, 1959.

ASSOCIATION: Tsentral'nyy aero-gidrodinamicheskiy institut im. N. Ye. Zhukovskogo (Central Institute of Aero- and Hydrodynamics imeni N. Ye. Zhukovskiy)

PRESENTED: August 1, 1960, by L. I. Sedov, Academician

SUBMITTED: July 24, 1960

GRODZOVSKIY, G. L. and FROLOV, V. V.

[redacted] "Optimum Contour Heat Rejection Fins Cooled by Radiation."

report presented at thel 13th Intl. Astronautics Congress, Varna, Bulgaria, 23-29 Sep 62.

GRODZOVSKIY, .G. L. , IVANOV, Yu. N. and TOKAREV, V. V.

"On the Motion of a Body of Variable Mass with Constant and Decreasing Power Consumption in a Gravitational Field.:"

Report presented at the 13th Intl. Astronautics Congress, Varna, Bulgaria, 23-29 Sep 62.

GRODZOVSKIY, G.L. (Moskva)

Turbulent boundary layer of a plane plate. PMTF no.4:117-119 Jl-Ag '62. (MIRA 16:1)
(Boundary layer) (Fluid dynamics)

3.2200
26.5190

S/179/62/000/005/012/012
E031/E135

AUTHOR: Grodzovskiy, G.L. (Moscow)

TITLE: On the motion of a body of variable mass with constant expenditure of power in a gravitational field, taking into account relativistic effects

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Mekhanika i mashinostroyeniye, no.5, 1962, 184

TEXT: Problems of optimizing the jet-propelled motion of a body of variable mass in a gravitational field for constant and optimal expenditure of power N within the framework of non-relativistic mechanics, were studied. As the velocity increases the relativistic level is first reached for an exhaust velocity V; the effect of this on the choice of the optimum parameters of motion for a body of variable mass m for N = const will be considered. The equations of motion and energy have the form:

$$P = ma(t) = -\frac{dm}{dt} V \frac{1}{\sqrt{1 - V^2/c^2}} \tag{1}$$

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$$N = -\frac{dm}{dt}\left(\frac{c^2}{\sqrt{1 - v^2/c^2}} - c^2\right) = ma(t)\,v\frac{1 - \sqrt{1 - v^2/c^2}}{v^2/c^2} \qquad (2)$$

To illustrate, consider the simplest case of motion at constant thrust P for a given time T. In this case the total useful mass ejected is

$$G_M = -g_o\int_0^T dm$$

and the weight of the source of power $G_N = \alpha N$ (with given specific weight α) is

$$G_M + G_N = PT\left(\frac{g_o}{v}\sqrt{1 - \frac{v^2}{c^2}} + \frac{\alpha}{T}\,v\,\frac{1 - \sqrt{1 - v^2/c^2}}{v^2/c^2}\right) \qquad (3)$$

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For given initial weight G_o the maximum useful weight

$$G_n = G_o - (G_M + G_N)$$

naturally corresponds to the minimum of $(G_M + G_N)$ and some optimum value of V satisfying Eq.(3). Eq.(3) can be written approximately as

$$G_M + G_N \cong \mu T \left[\frac{g_o}{V} \left(1 - \frac{1}{2}\frac{V^2}{c^2}\right) + \frac{\alpha}{2T} V \left(1 - \frac{1}{4}\frac{V^2}{c^2}\right) \right] \tag{4}$$

whence the optimum value of V is approximately

$$V_{opt} \approx \sqrt{\frac{2g_oT}{\alpha}} \left[1 - \frac{5}{4}\frac{g_oT}{\alpha x^2}\right]^{-1} \approx \sqrt{\frac{2g_oT}{\alpha}} \left[1 - \frac{5}{8}\frac{V^2}{c^2}\right]^{-1}. \tag{5}$$

$$\frac{G_N}{G_M} = 1 + \frac{3}{2}\frac{V^2}{c^2} \qquad (6)$$

Hence relativistic effects increase the optimum exhaust velocity V and the ratio G_N/G_M. Note that for values of T/α of the order of 1 year kg/kilowatt, the relativistic correction to unity in the denominator in Eq.(5) is of the order of 10^{-6}.

SUBMITTED: May 25, 1962

[Abstractor's note: Essentially complete translation.]

GRODZOVSKIY, G. L. (Moskva)

Optimum formula for heat conducting radiation cooled fins. Izv. AN SSSR. Otd. tekh. nauk. Energ. i avtom. no.6:39-45 N-D '62. (MIRA 16:1)

(Heat—Transmission) (Thermodynamics)

GRODZOVSKIY, G.L.

Propagation of laminar and turbulent axisymmetric spreading jets in a flooded space. Prom.aerodin. no.23:66-71 '62. (MIRA 16:4)
(Turbulence) (Jets—Fluid dynamics)

GRODZOVSKIY, G.L.

Flow of a free turbulent jet into a moving medium. Prom.aerodin. no.23: 119-165 '62. (MIRA 16:4)
(Jets—Fluid dynamics) (Turbulence)

GRODZOVSKIY, G.L.; KUZNETSOV, Yu.Ye.; TOKAREV, M.V.

Approximate calculation of axisymmetric supersonic flows under internal problem conditions. Prom.aerodin. no.24:152-157 '62. (MIRA 16:7)

(Aerodynamics, Supersonic)

GRODZOVSKIY, G. L., STRASENKO, A. L.,

"On the contour of radiating elements part III; the form of a flexible thread in the centrifugal force field"

report to be submitted for the 14th Congress Intl. Astronautical Federation, Paris, France, 25 Sep-1 Oct 1963

GRODZOVSKIY, G. L., TOKAREV, V. V., and IVANOV, I. N.,

"On the motion of a body of variable mass with constant and decreasing power consumption in a gravitational field; part III"

report to be submitted for the 14th Congress Intl. Astronautics Federation, Paris, France, 25 Sep-1 Oct 1963

DUBOSHIN, G.N., MOISEYEV, N.N., GROZDOVSKIY, G.L.

Utilization of Sputniks for meteorelogical and television purposes. Reports of the following Soviet Scientists were presented at the XIIIth International Congress on Astronautics in Varna, Bulgaria

P: Tekhnika Molodezhi, #1, 1963, pp. 24-25

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ACCESSION NR: AP3004806 S/0179/63/000/004/0115/0120

55

AUTHOR: Grodzovskiy, G. L. (Moscow)

TITLE: Supersonic flow with subsonic axial velocity component about a flat cascade and a perforated wall

SOURCE: AN SSSR. Izv. Otd. tekh. nauk. Mekhanika i mashinostroyeniye, no. 4, 1963, 115-120

TOPIC TAGS: cascade, perforated wall, supersonic flow

ABSTRACT: A supersonic flow about a flat periodic cascade with no separation having a subsonic axial component of the incident flow in a direction normal to the cascade-plane is considered. Fig. 1 of the Enclosure shows the typical flow configurations for concave and convex wedges. On the basis of the author's non-linear theory (Grodzovskiy, G. L. Sverkhzvukovoye obtekaniye ploskoy reshetki i perforirovannoy stenki s dozvukovoy osevoy sostavlyayushchey. Vsesoyuzny*y c"yezd po teoreticheskoy i prikladnoy mekhanike. M., 27, 1—3, II 1960. Annotatsii dokladov, AN SSSR, 1960), expressions for basic flow parameters are established which take into account the pressure losses. The flow fields both in front of the cascade and far upstream (see Fig. 2) are studied. The relationship

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ACCESSION NR: AP3004806

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between flow parameters in the cascade channel and incident flow is derived. A numerical example of flow past the cascade shown in Fig. 1 is given, and the results are presented in graphs which indicate the guiding action of the cascade. An important specific case is considered: a perforated boundary with transverse slots in supersonic flow. The results for this case are presented in graphs and discussed. Conditions for the full equalization of a nonuniform two-dimensional supersonic flow with P_0 a constant are established. Orig. art. has: 9 figures and 20 formulas.

ASSOCIATION: none

SUBMITTED: 13Feb62 DATE ACQ: 06Sep63 ENCL: 01

SUB CODE: AI NO REF SOV: 004 OTHER: 003

Card 2/2

L 17077-63 ES(w)-2/EPR/EPA(b)/EWT(1)/FS(b)/EWT(m)/EWG(k)/FCC(w)/FS(v)-2/BDS/ES(v) AEDC/AFFTC/ASD/AFMDC/ESD-3/APGC/AFWL/IJP(C)/SSD Ps-4/Pd-4/Pz-4/Pe-4/Pab-4/ Po-4/Pg-4/Pq-4 WW/GW

ACCESSION NR: AP3006364 S/0258/63/003/003/0590/0615
108

AUTHOR: Grodzovskiy, G. L. (Moscow); Ivanov, Yu. N. (Moscow); Tokarev, V. V. (Moscow)

TITLE: The mechanics of space flight with low thrust. I.

SOURCE: Inzhenerny*y zhurnal, v. 3, no. 3, 1963, 590-615

TOPIC TAGS: space flight, solar sail, low thrust, rocket thrust, space ship, space flight mechanics, low thrust rocket, low thrust vehicle

ABSTRACT: This article is the first in a series of review articles dealing with the mechanics of space flight at low thrust. On the basis of Soviet and non-Soviet sources the article reviews these principal subject areas: 1) the mechanics of space flight with a solar-sail space vessel, including fundamental relationships and problems and the flight of such a vessel between planetary orbits and its escape from a gravitational field; and 2) the mechanics of space flight with low-thrust engines, including the selection of optimum weight ratios for simpler cases of motion and an ideal

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ACCESSION NR: AP3006364

control system with optimum weight and thrust control. The following recent works are noted among the 20 Soviet sources reviewed: V. K. Isayev, "The principle of L. S. Pontryagin's maximum and the optimum programing of rocket thrust," Avtomatika i telemekhanika, v. 22, no. 8, 1961, and v. 23, no. 1, 1962; A. N. Zhukov and V. N. Lebedev, "A variational problem in flight between heliocentric circular orbits by means of a solar sail," Sb. Iskusstvenny*ye sputniki Zemli, 1963, in publication; A. A. Kary*mov, "Determination of forces and moments of light pressure acting on a body moving in space," Prikl. matem. i mekhan., v. 26, no. 5, 1962; G. L. Grodzovskiy, "Optimization of parameters of motion of a body with vari-ble mass and limited power consumption in the presence of a nonlinear dependence between the power source weight and the power output," Izv. AN SSSR, Otd. tekh. N. 1963, in publication; and Yu. N. Ivanov, "The motion of a body with variable mass, limited power output, and given time of operation," Prikl. matem. i mekhan., v. 27, no. 5, 1963. Orig. art. has: 25 figures, and 70 formulas.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 27Sep63 ENCL: 00

SUB CODE: AS NO REF SOV: 020 OTHER: 053

Card 2/2

GRODZOVSKIY, G.L. (Moskva); IVANOV, Yu.N. (Moskva); TOKAREV, V.V. (Moskva)

Mechanics of space flight with low thrust. Part 2. Inzh.zhur. 3 no.4:748-766 '63. (MIRA 16:12)

GRODZOVSKIY, G. L.; IVANOV, Yu. N.; TOKAREV, V. V.

"Low thrust space flight mechanics. Survey paper."

report submitted for 15th Intl Astronautical Cong, Warsaw, 7-12 Sep 64.

GRODZOVSKIY, G. L.; STASENKO, A. L.; FROLOV, V. V.

"On the shape of heat rejection elements cooled by radiants."

report submitted for 15th Intl Astronautical Cong, Warsaw, 7-12 Sep 64.

GRODZOVSKY, G.L.; KUKANOV, F.A. (Moscow):

"Gas tank rupture in vacuum."

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 Jan - 5 Feb 64.

GRODZOVSKY, G.L.; KUZNETSOV, Yu. Ye.; KHUDYAKOV, G. Ye. (Moscow):

"The gas dynamic theory of the flow of a fluid with varying phases."

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 Jan - 5 Feb 64.

GRODZOVSKY, G.L.; IVANOV, Yu.N. ;TOKAREV, V.V. (Moscow)

"Mechanics of space flight with low thrust".

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 Jan - Feb 64.

ACCESSION NR: AP4026965 S/0258/64/004/001/0168/0196

AUTHORS: Grodzovskiy, G. L. (Moscow); Ivanov, Yu. N. (Moscow); Tokarev, V. V. (Moscow)

TITLE: Mechanics of low thrust cosmic flights. 3.

SOURCE: Inzhenerny*y zhurnal, v. 4, no. 1, 1964, 168-196

TOPIC TAGS: cosmic flight optimization, power-limited vehicle, exhaust velocity, thrust vector, maximum payload, flight trajectory

ABSTRACT: The third and last series in the analysis of cosmic flight optimization of power-limited vehicles has been presented. Part One dealt with the limits of the regulating characteristics of the vehicle system. The attainable variation range for flow rate q and exhaust velocity V is investigated as a function of maximum jet thrust power N_{max}. The optimum control of the thrust vector, V and N are discussed under the conditions

$$0 < N(t) < N_{max}(V) < N_0,$$

$$0 < V_{min} < V(t) < V_{max} < \infty,$$

ACCESSION NR: AP4026965

An expression is derived relating the power source weight G_N to the flight trajectory characteristics. In Part Two the motion of a power-limited vehicle is discussed for the case of engine operation time less than the vehicle flight duration. The variational problem is considered under variable thrust power flow rate and thrust vector conditions with the optimum combination of power-limited and exhaust velocity-limited engines. It is shown that this combination yields an advantage in total payload if each type of engine has the same payload before combination. Part Four deals with reliability in engine performance for missions of long duration. The optimization criterion assumed here is the condition of a minimum in the sum of average necessary and reserve fuel weights plus the dead weight of the engine. An example is given where it is shown that in a round trip mission the departure leg takes place faster than the return leg of the trip, shifting the given engine-time break to the beginning of the trajectory. The optimization studies are extended to include weights in addition to the previously considered weights of working substance, power source, and payload. Finally, mid-course correction possibilities are studied, including corrections in velocity and position, and a general expression is derived for the optimal correction moment distribution. Orig. art. has: 145 equations, 11 figures, and 1 table.

L 41783-65 EEO-2/EWT(d)/FBD/FSS-2/EWT(1)/EEC(a)/EWP(m)/FS(v)-3/EEC(j)/EEC(k)-2/EEC(r)/EWG(v)/EWA(d)/EEC(c)-2/EED-2/EWA(c) Pn-4/Po-4/Pe-5/Pq-4/Pac-4/Pg-4/Pae-2/Ph-4/Pk-4/Pl-4 IJP(c) AST/GW/BC

ACCESSION NR: AP4037116 S/0258/64/004/002/0392/0423

83

AUTHORS: Grodzovskiy, G. L. (Moscow); Ivanov, Yu. N. (Moscow); Tokarev, V. V. (Moscow)

B

TITLE: Mechanics of space flight with low thrust. 4

SOURCE: Inzhenernyy zhurnal, v. 4, no. 2, 1964, 392-423

TOPIC TAGS: optimum trajectory, optimum control, osculatory system, space maneuver, radial acceleration, tangential acceleration, orbital plane, steepest descent method, algorithm method, solar sail, Ritz method

ABSTRACT: A detailed study has been made of various analytic solutions of equations of dynamics for space flight, both exact and approximate, on small perturbation force assumption. Numerical methods have been described for constructing optimum trajectories and optimum controls. In part one the equation of motion in Cartesian and spherical coordinates is discussed, and an osculatory system of variables is introduced. Some of these equations in spherical coordinates are

$$\ddot{r} = a_r + r\dot{\varphi}^2 - 1/r^2, \quad r\ddot{\varphi} = a_\varphi - 2\dot{r}\dot{\varphi}. \quad (1)$$

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ACCESSION NR: AP4037116

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$$v_r v_r' = a_r + v_\varphi^2/r - 1/r^2, \quad v_r v_\varphi' = a_\varphi - v_r v_\varphi/r. \quad (2)$$

$$R' = a\frac{\cos\gamma}{\sin\theta}, \quad M' = \frac{ar}{v}\frac{\cos(\theta+\gamma)}{\sin\theta}. \quad (3)$$

$$\dot{r} = v\sin\theta, \ r\dot{\theta} = v\cos\theta, \ \dot{v} = a\cos\gamma - (1/r^2)\sin\theta,$$
$$v\dot{\theta} = a\sin\gamma + (v^2/r - 1/r^2)\cos\theta.$$

$$\frac{dr}{ds} = \sin\theta, \ r\frac{d\varphi}{ds} = \cos\theta, \ v\frac{dv}{ds} = a\cos\gamma - \frac{1}{r^2}\sin\theta,$$
$$v^2\frac{d\theta}{ds} = a\sin\gamma + \left(\frac{v^2}{r} - \frac{1}{r^2}\right)\cos\theta. \quad (4)$$

The general analytic solution of the equation

$$\dot{x}_i = a f_i(x_j, t) \quad (a \ll 1, \ f_i(x_j, t+2\pi) = f_i(x_j, t), \ i, j = 1, \ldots, n), \quad (5)$$

is discussed, and particular solutions of the above four sets of equations of motion are carried out for elementary space maneuvers. These include: radial

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acceleration, $a_\varphi = 0$ in equation (2) above, where for $a_r < 0$ or $1/8 > a_r > 0$ the motion is finite and for $\infty \geq r \geq 1$ it is infinite; transverse acceleration $a_r = 0$ in equation (1); tangential acceleration with $\gamma = 0$ in equation (4); normal acceleration, $\gamma = \pi/2$ in equation (3) above; acceleration perpendicular to the instantaneous orbital plane, and a constant acceleration vector. A general method is outlined for numerical computations of the above trajectories. The functional method of steepest descent is discussed, and conditions for trajectory optimization are considered in terms of the extremal of the functional

$$J = \int_0^T \Phi(x, \dot{x}, t)\, dt.$$

For control optimization, the gradient method is introduced according to the method outlined by D. Ye. Okhotsimskiy (K teorii dvizheniya raket. PMM, t. 10, No. 2, 1946). The method is applied to several special cases. These are: the algorithm method for a trajectory with an unspecified terminal point and a single control function; the algorithm method for a trajectory with both initial and terminal points fixed; and the algorithm method where the terminal point is free and the termination time T of the motion is unspecified. The method is applied to an

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ACCESSION NR: AP4037116

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Earth-to-Mars trajectory with a solar sail. Finally, several methods are outlined for substituting the functional with functions of finite number of variables. These include minimization of a function with subsidiary conditions, the Ritz method with coefficients determined from the method of steepest descent, and the broken path method applied to the Lagrange or Meyer variational problems. Orig. art. has: 144 equations and 20 figures.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: SV

NO REF SOV: 040 OTHER: 064

Card 4/4

L 57864-65 EWT(d)/EWT(m)/EWP(f)/EPR/T-2/EWA(c) Ps-4
ACCESSION NR: AP5016231 UR/0373/65/000/003/0040/0048

AUTHOR: Grodzovskiy, G. L. (Moscow, Kiev); Kiforenko, B. N. (Moscow, Kiev); Tokarev, V. V. (Moscow, Kiev) 19 B

TITLE: Energy storage in power-limited flight optimization problems

SOURCE: AN SSSR. Izvestiya. Mekhanika, no. 3, 1965, 40-48

TOPIC TAGS: power limited flight, energy storage, optimal flight, Pontryagin maximum principle

ABSTRACT: This article deals with the variational problem of the maximum payload in flights with power-limited propulsion systems with energy storage. It is assumed that the propulsion system consists of a power source N $(0 \le N \le N_0)$, an energy storage E $(0 \le E \le E_0)$, and an engine with thrust P $(0 \le P \le P_0)$, and that weights for these components are, respectively: $G_V = \alpha N_0$, $G_e = \beta E_0$ and $G_\gamma = \gamma P_0$, where α, β, γ are proportionality factors (specific weights). The variational problem is defined as follows: given the total initial weight G_0 of the propulsion system, the factors α, β, γ, the dynamic maneuver with the duration T, it is required to find optimal operating conditions for the power source $N(t)$, the energy storage $N_e(t)$ $(N_e = -E)$, the thrust force $P(t)$, and the unit vector $i(t)$ of the thrust direction which will ensure the maximum payload G_π. A complete system of differential

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equations, boundary conditions, constraints upon the control functions, and phase coordinates is written which describes the defined variational problem in Mayer's formulation. The optimal controls i(t), P(t), $N_e(t)$, and N(t) are determined by using the maximum principle of Pontryagin. The obtained control functions are analyzed for the interior sections of the trajectory and for the boundary sections. A propulsion system with energy storage only (without power source) is also investigated as a particular case of the general problem. The case of the so-called "ideal controlled propulsion system," which is characterized by the fact that there are no limitations upon the upper bound of the thrust force P($P \geq 0$) and $G_Y = 0$ is analyzed. As an illustration of the solution of the general problem, two maneuvers are analyzed for which the equations of the variational problem can be completely integrated. The case when the thrust force P is constant is also investigated. Orig. art. has: 36 formulas. [LK]

ASSOCIATION: none

SUBMITTED: 26Feb65 ENCL: 00 SUB CODE: SV, IE

NO REF SOV: 004 OTHER: 001 ATD PRESS: 4038

Card 2/2

L 51455-65 EWA(h)/EWT(d)/EWT(m)/T-2/EWA(d)/EWP(w)/EWP(v)/EWT(k) Pf-4/Peb EM/
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ACCESSION NR: AP5011329 UR/0258/65/005/002/0352/0355
531.353

25
23
B

AUTHOR: Grodzovskiy, G. L. (Moscow); Kukanov, F. A. (Moscow)

TITLE: Fragmentation of a ruptured vessel in a vacuum

SOURCE: Inzhenernyy zhurnal, v. 5, no. 2, 1965, 352-355

TOPIC TAGS: fragmentation problem, gas filled vessel, gas escape mechanism, isothermic process, adiabatic process

ABSTRACT: The authors solve problems on the motion (in a non-force field) of two fragments produced by the rupture of a gas-filled vessel in a vacuum. Postulating several assumptions on the mechanism of gas escape through the rupture gap, they write expressions describing motion, initial conditions and variable gas pressure for both fragments. Specific calculations were performed for isothermic and adiabatic processes of gas escape. The former process was reduced to the form $f''' + ff'' = 0$,

the latter to $f''' + f''^{n} = 0$, at initial conditions given by

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$\eta = 0: f = 0, f' = 0, f'' = 1,$

Numerical results of digital computer calculations are presented in tabular form. Orig. art. has: 1 table and 23 formulas.

ASSOCIATION: None

SUBMITTED: 29Oct64 ENCL: 00 SUB CODE: ME

NO REF SOV: 000 OTHER: 001

shell 26

space structure 26

Card 2/2

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00051701(

L 05879-67 EWP(m)/EWT(1) GW/GD

ACC NR: AT6022476 SOURCE CODE: UR/0000/65/000/000/0181/0197

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B+1

AUTHOR: Grodzovskiy, G. L.; Ivanov, Yu. N.; Tokarev, V. V.

ORG: None

TITLE: Optimization problems in the mechanics of low-thrust space flight

SOURCE: Vsesoyuznyy. s"yezd po teoreticheskoy i prikladnoy mekhanike. 2d, Moscow, 1964. Analitcheskaya mekhanika. Ustoychivost' dvizheniya. Nebesnaya ballistika (Analytical mechanics. Stability of motion. Celestial ballistics); trudy s"yezda, no. 1, Moscow, Izd-vo Nauka, 1965, 181-197

TOPIC TAGS: trajectory optimization, space flight, thrust optimization, solar sail

ABSTRACT: The authors consider the problem of optimization in the mechanics of space flight with low thrust. Included in this problem are selection of the optimum ratios between the weight components of the spacecraft and optimum control of the thrust system as well as determination of the optimum trajectories of the flight in the aggregate. A relationship is established between the weight characteristics and parameters of the engine system and the possibilities for thrust control are discussed. Optimization of flight mechanics is considered in detail for systems using solar sails and

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power-limited propulsion systems, e. g. electric reaction engines. It is shown that the problem of optimization for an ideal system resolves into two independent problems: 1. finding the optimum ratio between the weight of the power source and the weight of the working material and 2. finding the optimum trajectories and programs for the rocket acceleration vector. The literature covering the numerical solution of these problems is briefly reviewed. Orig. art. has: 13 figures, 34 formulas.

SUB CODE: 22/ SUBM DATE: 04Dec65/ORIG REF: 022/ OTH REF: 023

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Card 2/2

ACC NR: AP6034139 SOURCE CODE: UR/0424/66/000/005/0003/0012

AUTHOR: Grodzovskiy, G. L. (Moscow)

ORG: none

TITLE: Some variational problems in space flight mechanics

SOURCE: Inzhenernyy zhurnal. Mekhanika tverdogo tela, no. 5, 1966, 3-12

TOPIC TAGS: flight mechanics, space flight, spacecraft maneuver, variational problem

ABSTRACT: The effect of weight constraints is analyzed on the optimal motion parameters of a variable mass body in a gravitational field. The power system under investigation has the following three constraints: gas efflux velocity, storage power level, and thrust. General variational equations are derived for payload weight G_π between two points in phase space, with an engine that has a given specific weight γ and a limited gas efflux velocity $V \leq V_{max}$. Numerical results are obtained for the relative maximum energy as a function of initial acceleration, for various values of G_π and γ. These results are shown graphically. For example, for $\gamma \simeq 0.01$--0.02, the optimum initial acceleration a_0 varies between 2.5 and 4.0. Next, the fundamental properties of an ideally maneuverable space engine are discussed for a given working medium storage. This process consists of determining the optimum expression of an

ACC NR: AP6034139

engine weight component that will allow ideal maneuvering with a characteristic velocity Δv. This is found to be

$$\frac{\Delta v}{V_*} = \ln \frac{1 + \tau_* + k\tau_* - \tau_* G_K}{1 + k\tau_* G_K},$$

where $\tau_* = KT$, T being time and 1/K--storage time of working medium equal to the weight of the energy source. Various graphical plots of the above expression are obtained where τ_* is given as a parameter. The author expresses his sincere gratitude to V. V. Tokarev for his valuable remarks concerning the above problems. Orig. art. has: 45 equations and 10 figures.

SUB CODE: 20, 22/ 21/ SUBM DATE: 26Mar66/ ORIG REF: 010/ OTH REF: 015

Card 2/2

ACC NR: AR6029290 SOURCE CODE: UR/0313/66/000/006/0023/0023

AUTHOR: Grodzovskiy, G. L.; Ivanov, Yu. N.; Tokarev, V. V.

TITLE: Problems of optimization in the mechanics of cosmic flight with low thrust

SOURCE: Ref. zh. Issledovaniye kosmicheskogo prostranstva, Abs. 6.62.180

REF SOURCE: Tr. II Vses. s"yezda po teor. i prikl. mekhan., 1964. Obz. dokl. Vyp. I. M., Nauka, 1965, 181-197

TOPIC TAGS: mars flight, space flight, trajectory optimization, optimum trajectory, optimal control, thrust optimization, solar sail, jet engine, thrust to weight ratio, thrust vector control

ABSTRACT: The optimization problem is reviewed as one of selecting the optimum weight characteristics for the vehicle, the optimum engine control, and the optimum trajectory. Considered as engines are the solar sail and the electrical jet engine of limited power. Two optimization problems are suggested for solution with respect to these latter: (1) calculation of optimum relationship of weights of power source and working substance, and (2) calculation of the optimum trajectory and the program for controlling the thrust vector. Examples of calculations for an earth-Mars flight are cited. Bibliography of 54 titles. V. Ponomarev. [Translation of abstract]

SUB CODE: 22

Card 1/1

Microanalysis of carbon monoxide by means of platinised asbestos. M. K. Gamozovskii. *Izvest. Teplotekh. Inst.* (*Trans. Thermo-Tech. Inst. Russia*) 193[illegible], No. 7, 44-54.—Small quantities of CO in air were detd. by adsorption in asbestos covered with Pt black. The app. and procedure are described in detail. A. A. B.

METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES INDEX

Catalytic oxidation of sulfur dioxide present in flue gases by ionized solutions of heavy metals. M. K. Grodzovskii. *Izvestiya Teplotekh. Inst.* No. 4, 22-3(1933). — SO_2 in combustion gases can be converted into H_2SO_4 in the presence of such catalysts as salts of Fe, Cu and Mn by water and the O_2 which is always present in flue gases.

A. A. Boehtlingk

METALLURGICAL LITERATURE CLASSIFICATION