L 61646-65 EWT(l)/EWP(m)/EWG(v)/FCC/EWA(d)/EEC-4/EPR/EEC(t)/FCS(k)/EWA(h)/
EWA(c) Po-4/Pd-1/Pe-5/Pq-4/Pae-2/Peb/Pi-4 WW/GW

ACCESSION NR: AP5015581 UR/0033/65/042/003/0552/0556
523.001

AUTHORS: Kaplan, S. A.; Podstrigach, T. S.

TITLE: Parameters of shock waves in partially ionized gas

SOURCE: Astronomicheskiy zhurnal, v. 42, no. 3, 1965, 552-556

TOPIC TAGS: shock wave, ionized gas, electronic computer, electron temperature, ion temperature

ABSTRACT: The authors investigated the system of equations governing the structure of shock waves in incompletely ionized hydrogen with small admixtures of heavy elements (responsible for de-excitation of the gas). The loss of energy on ionization of the hydrogen is considered, and the radiation in a discontinuous spectrum is examined. The energy loss during excitation of discrete levels of the hydrogen atoms was not considered since it depends on the optical thickness of the shock wave front in the Lyman series, and when this is large the loss is relatively small. Numerical computations were made by means of an electronic computer to express the relations between shock wave velocity and the maximum electron temperature, the width of the front and the width of the de-excitation

L 61646-65
ACCESSION NR: AP5015581

zone, and the final density of the gas. In computing the various parameters, different de-excitation values were considered. The results verify previous work in regard to the rise in electron temperature to some maximum at a definite distance from the front of the ion-atom jump, after which the temperature decreases. These computations, however, permit the determination of the dependence of this maximum on wave velocity, initial ionization, and value of de-excitation. The first is significant; the latter two prove to be relatively unimportant. It was found that the ion temperature remains above the electron temperature by several thousand degrees at all points in the shock wave beyond the point of maximum electron temperature. Orig. art. has: 5 figures.

ASSOCIATION: Gor'kovskiy nauchno-issledovatel'skiy radiofizicheskiy in-t (Gorki Scientific Research Institute of Radiophysics)

SUBMITTED: 04Aug64 ENCL: 00 SUB CODE: ME, NP

NO REF SOV: 006 OTHER: 000

Card 2/2

L 64729-65 EWT(1)/EWP(m)/EWA(d)/FCS(k)/EWA(h)/EWA(c) WW

ACCESSION NR: AP5015435 UR/0185/65/010/006/0601/0609

AUTHOR: Pidstryhach, T. S. (Podstrigach, T. S.)

32
30
B

TITLE: On the structure of shock waves in an incompletely ionized gas

SOURCE: Ukrayins'kyy fizychnyy zhurnal, v. 10, no. 6, 1965, 601-609

TOPIC TAGS: mhd shock wave, shock wave structure, ionized gas, recombination reaction

ABSTRACT: Investigations of shock waves in incompletely ionized gases are important in explaining phenomena taking place under various physical and astrophysical conditions, such as occur in space flights. A general investigation was carried out, starting from Landau's kinetic equation and using the method of Mott-Smith. A system of equations is obtained which describes the change in the density, the degree of ionization of the gas, and the electron and ion temperature behind the shock wave, with allowance for ionization processes, recombination, loss of energy to particle excitation and radiation in free-free transitions. Integration was carried out on an electronic computer. It was found that the electron temperature attains a maximum at a certain distance from the ion-atom jump, and subsequently decreases by several thousand degrees. This decrease depends on the radiation parameter. The highest maximum of the electron temperature depends on the intensity of

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ACCESSION NR: AP5015435

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the shock wave. The dependence of the width of the wave front on various parameters is found. The width of the region of increased electron temperature is found to depend on the initial degree of ionization of the gas. Weak shock waves cannot ionize an initially weakly ionized gas. Behind the shock wave, where the ion and electron temperature decreases an initially slow density increase takes place. "In conclusion I express my sincere gratitude to Professor S. A. Kaplan under whose direction this work was carried out." Orig. art. has: 8 figures and 20 formulas.

ASSOCIATION: Naukovo-doslidnyy radiofizychnyy instytut pry Hor'kivs'komu derzhuniversiteti [Nauchno-issledovatel'skiy institut radiofiziki Gor'kovskogo gosudarstvennogo universiteta] (Scientific Research Radiophysics Institute of the Gor'kiy State University)

SUBMITTED: 07Aug64 ENCL: 00 SUB CODE: ME

NR REF SOV: 007 OTHER: 002

Card 2/2

PODSTRIGACH, T. S.

L 18260-63 EPR/EPA(b)/EPF(c)/EWT(l)/EPF(n)-2/BDS/EEC(b)-2/ES(w)-2 AFFTC/ASD/SSD ~~Ps-4/Pd-4/Pr-4/Pu-4/Pi-4/Po-4/Pab-4~~ 94 92

ACCESSION NR: AP3002129 WW S/0185/63/008/006/0706/0707

AUTHOR: Pidstryhach, T. S.

TITLE: Calculation of the collision integral in the transport equation for a shock wave

SOURCE: Ukrains'kyy fizychnyy zhurnal, v. 8, no. 6, 1963, 706-707

TOPIC TAGS: shock wave; ionized gas; collision term; electron-ion collision; Fokker-Planck collision term; strong shock wave-front; Landau collision term; ion-ion collision; plasma

ABSTRACT: In view of the highly intriguing nature of the phenomena occurring in the center of the front of a strong shock wave, the author investigated the structure of shock waves in a partially ionized gas. Since equations of kinetics, of special importance to shock waves in an incompletely ionized gas are required, the calculation of the collision term is fundamental. The author performed calculations of collisions between atoms, ions, and electrons, on the basis of the equation of kinetics given by Landau, L. D. (Zhurnal eksper. i teor. fiziki, 7, 103, 1937), and derived expression (4) of the Enclosure. He notes that when m sub 1 = m sub 2, expression (4) is in agreement with the analogous formula of

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L 18260-63
ACCESSION NR: AP3002129

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Tidman, D. A. (Phys. Rev. 111, 1439-1446, 1958), which attests to the equivalence of the Fokker-Planck and Landau collision terms. The results obtained can be utilized both in the case of collisions between ions of different mass and in the case of electron-ion collisions. These results are being utilized in further investigations. "I wish to express my sincere appreciation to S. A. Kaplan for his guidance of this project." Orig. art. has: 4 equations.

ASSOCIATION: L'vivs'ky*y Derzhuniversy*tet im. Iv. Franka (L'vov State University)

SUBMITTED: 7 Aug 62 DATE ACQ: 12 Jul 63 ENCL: 01

SUB CODE: PH NO REF SOV: 001 OTHER: 002

Card 2/2

KAPLAN, S.A.; LOGVINENKO, A.A. [Logvynenko, O.O.]; PODSTRIGACH, T.S. [Pidstryhach, T.S.]

Calculation of gasomagnetic shock wave parameters. Ukr.fiz. zhur. 4 no.4:438-442 Jl-Ag '59. (MIRA 13:4)

1. L'vovskiy gosudarstvennyy universitet im.Iv.Franko.
(Shock waves)

PODSTRIGACH, T.S. [Pidstryhach, T.S.]

Structure of shock waves in an incompletely ionized gas. Ukr. fiz. zhur. 10 no.6:601-609 Je '65. (MIRA 18:7)

1. Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom gosudarstvennom universitete.

PODSTRIGACH, Ya.S., nauchnyy sotrudnik.

Expanding convergence fields in developing Kepler's coordinates of motion. Dop.ta pov.L'viv.un. no.3 pt.2:44-45 '52.

(MLRA 9:11)

(Orbits)

PODSTRIGACH, Ya.S.

Stresses in a plane surface weakened by two unequal round openings. Dop.AN URSR no.6:456-460 '53. (MLRA 7:1)

1. Institut mashinoznavstva ta avtomatiki Akademii nauk Ukrains'koi RSR. Predstaviv diysniy chlen Akademii nauk Ukrains'koi RSR G.M.Savin. (Strains and stresses)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001341510019-6"

PODSTRIGACH, Ya. S.

"Stress Around Two Unequal Circular Apertures in an Elastic Sheet." Cand Phys-Math Sci, L'vov State U, L'vov, 1954. (RZhMekh, Jan 55)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (12)
SO: Sum. No. 556, 24 Jun 55

PODSTRIGACH, Ya.S.

Action of a concentrated force on the edge of a semiplane having a circular aperture. Dop. AN URSR no.3:217-219 '54. (MIRA 8:4)

1. Institut mashinoznavstva ta avtomatiki AN URSR, m.L'viv. Predstavleno deystvitel'nym chlenom Akademii nauk USSR G.N.Savinym. (Elasticity)

PODSTRIGACH, YA.S.

2

2853. Podstrigach, Ya. S., The stresses about two unequal apertures in a two-dimensional field (in Russian), *Nauch. zap. in-ta mashinoved. i avtomatiki, Akad. Nauk USSR, ser. Mashinoved* 4, 3, 60–71, 1955. *Ref. Zh. Mekh.* 1956, Rev. no. 1611.

The stress condition is investigated of an elastic, isotropic plate of infinite extent, weakened by two unequal, circular openings (cutouts). It is assumed that normal and tangential stresses act on the boundaries of the openings, and are in equilibrium of each contour.

Introducing the bipolar coordinates ξ and η, associated with the representation (projection)

$$z = -a \operatorname{cth} \frac{i\zeta}{2} \quad (\zeta = \xi + i\eta), \tag{1}$$

author transforms the biharmonic equation for the stress functions U into the equation

$$\left[\frac{\partial^4}{\partial \eta^4} + 2\frac{\partial^4}{\partial \eta^2 \partial \xi^2} + \frac{\partial^4}{\partial \xi^4} - 2\frac{\partial^2}{\partial \eta^2} + 2\frac{\partial^2}{\partial \xi^2} + 1\right](gU) = 0 \tag{2}$$

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PODSTRIGACH, YA. S.

with reference to the function gL, where g is the first differential parameter of the bipolar system of coordinates.

The solution of Eq. (2) is found by the author in the form

$$\frac{1}{g} L = D_1 \eta\, ch\, \eta + K\,(ch\, \eta - \cos \zeta)\ln(ch\, \eta - \cos \zeta) +$$

$$+ \sum_{1}^{\infty} f_n(\eta) \cos n\xi \qquad [3]$$

where

$$f_n(\eta) = A_n\, ch\,(n+1)\eta + B_n\, ch\,(n-1)\eta + C_n\, sh(n+1)\eta +$$

$$f_1(\eta) = A_1\, ch 2\eta + B_1 + C_1\, sh\, 2\eta - D_1 \eta$$

Assuming further that the forces on the contour are expanded into series

$$\sigma_\eta^{(i)} = \sum_{0}^{\infty} \sigma_n^{(i)} \cos n\xi,\ \tau_{\xi\eta}^{(i)} \sin n\xi \quad (i = 1, 2) \qquad [4]$$

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PODSTRIGACH, YA. S

and applying the known relationships associating the stress components σ_ξ, σ_η, and $\tau_{\xi\eta}$ with the function gU in bipolar coordinates, the author, from the conditions on the contours and the condition at infinity

$$(gU)_\infty = 0$$

arrives at a system for determing the constants A_ν, B_ν, C_ν, D_ν, and h.

The case is investigated in detail when a uniform pressure is applied on the contour of each opening, and the case of multilateral tension at infinity.

A. K. Rukhadze, USSR

Courtesy of Referativnyi Zhurnal

Translation, courtesy Ministry of Supply, England

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Podstrigach, Ya. S.

PANASYUK, V.V.; PODSTRIGACH, Ya.S.; YAREMA, S.Ya.

Thermal stresses in a cylindrical shell. Dop. AN URSR no.3:231-234 '55.
(MLRA 8:11)

1. Institut mashinoznavstva ta avtomatiki Akademii nauk URSR. Predstaviv diysniy chlen Akademii nauk URSR G.M.Savin
(Elastic plates and shells)

PODSTRIGACH, Ya.S.

Stresses on a plane around two unequal circular holes. Nauch.zap. IMA AN URSR Ser.mashinoved. 4 no.3:60-71 '55. (MLRA 9:8)
(Strains and stresses)

Translation from: Referativnyy zhurnal. Mekhanika, 1957, Nr 8, p 104 (USSR) SOV/124-57-8-9292

AUTHORS: Panasyuk, V. V., Podstrigach, Ya. S., Yarema, S. Ya.

TITLE: Temperature Stresses in the Walls of High-pressure Boiler Shells (Temperaturnyye napryazheniya v stenkakh barabanov kotlov vysokogo davleniya)

PERIODICAL: Nauch. zap. In-ta mashinoved. i avtomatiki AN UkrSSR, 1956, Vol 5, pp 5-24

ABSTRACT: With periodic shut-downs during the process of operation the shells of high-pressure boilers are subjected to uneven heating, which creates temperature stresses in the shell walls. The paper presents an account of a theoretical as well as experimental investigation of the thermal stresses in the walls of a freely-supported cylindrical shell under the condition that the temperature varies only along the contour of a cross section in accordance with the law $t = t(s)$ (where s is the arc of the contour) and remains constant along both the generatrix and the wall thickness. The paper provides a numerical example of the calculation for temperature stresses. An account is also given of an experimental investigation with respect to the determination of the

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Temperature Stresses in the Walls of High-Pressure Boiler Shells SOV/124-57-8-9292

temperature field in the wall of a shell and of the determination of the elastic strains. The elastic strains were measured by wire resistance strain gages included in a bridge circuit. The paper compares the calculated results with those of the experimental investigations.

V. I. Danilovskaya

Card 2/2

SOV/124-58-3-3146

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 3, p 87 (USSR)

AUTHORS: Podstrigach, Ya. S., Plyatsko, G. V.

TITLE: The Effect of Heat Emission Upon Temperature Stresses in an Elastic Strip in Transient Thermal Conditions (Vliyaniye teplootdachi na temperaturnyye napryazheniya v uprugoy polose pri nestatsionarnom teplovom rezhime)

PERIODICAL: Nauchn. zap. In-ta mashinoved. i avtomatiki AN UkrSSR, 1957, Vol 6, pp 75-82

ABSTRACT: The authors present the solution of a problem on thermal conductivity for an infinite strip in which the temperature of the bottom surface varies at a constant rate, the side surfaces are thermally insulated, and the upper surface has a heat delivery into a constant-temperature medium; this solution contains a series of functions which depend upon the roots μ of the transcendental equation $\tan \mu l = -\mu/h$, where l is the thickness of the strip and h is the relative heat-exchange coefficient. For the above-indicated temperature field the problem is solved for the thermoelastic equilibrium of an infinite strip the surfaces of which are free of outside forces;

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SOV/124-58-3-3146

The Effect of Heat Emission Upon Temperature Stresses (cont.)

the boundary conditions on the top and bottom surfaces of the strip are fulfilled rigorously, while those on the lateral surfaces are fulfilled in the sense of de Saint-Venant's principle. Even though the temperature field is transient, the authors disregard the forces of inertia and discuss the problem as quasi-static. The stresses obtained (as well as the temperature) are in direct ratio to the heating rate. With ideal thermal insulation ($h = 0$) the stresses at a certain moment become practically constant. The stresses reach their greatest magnitude on the heated surface.

V. K. Prokopov

Card 2/2

AUTHOR: Podstrigach, Ya.S. 21-58-5-9/28

TITLE: Thermal Field in Thin Shells (Temperaturnoye pole v tonkikh obolochkakh)

PERIODICAL: Dopovidi Akademii nauk Ukrains'koi RSR, 1958, Nr 5, pp 505-507 (USSR)

ABSTRACT: The author has derived equations for determination of integral characteristics of temperature in thin shells, assuming that the thermal dissipation from the surface of the shell proceeds according to Newton's law. In a case of stationary thermal conditions and negligible heat emission from the shell surface, it is possible to determine a general form for solving the boundary problem for the shells of revolution of any profile.
There is one Soviet reference.

ASSOCIATION: Institut mashinovedeniya i avtomatiki (Institute of Machine Study and Automation)

PRESENTED: By Member of the AS UkrSSR, G.N. Savin

SUBMITTED: October 22, 1957

~~Card 1/2~~

SOV/20-121-2-20/53

AUTHORS: Podstrigach, Ya. S., Chayevskiy, M. I.

TITLE: The Influence of Internal Friction on the Fatigue Failure of Cyclically Deformable Parts (Vliyaniye vnutrennego treniya na ustalostnoye razrusheniye tsiklicheski deformiruyemykh detaley)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 121, Nr 2, pp. 268 - 270 (USSR)

ABSTRACT: When investigating the fatigue strength of steel samples it became evident that in a torsion with alternating sign and large amplitudes the breaking of machine part begins with the development of a high number of longitudinal surface cracks which finally unite to transverse cracks(see Fig 1). When heating the samples intensively the breaking occurs in consequence of the temperature stresses. The authors investigated cylindrical samples under the influence of torsion and temperature increase. The formula for the relation between the occurring stresses τ and the angle of shear γ is

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SOV/20-121-2-20/53

The Influence of Internal Friction on the Fatigue Failure of Cyclically Deformable Parts

$\tau = G\gamma + \frac{\psi}{2\pi} G\gamma_0 \sqrt{1-(\gamma/\gamma_0)^2}$, where G denotes the shear modulus, ψ the coefficient of energy distribution and γ_0 the amplitude value of γ. Investigations on the temperature distribution gave the result that modifications of the medium surrounding the machine part or of the temperature of this medium cannot save the production part from temperature stresses. The fatigue strength of cylindrical samples depends among other things on its diameter; in investigations on torsion e.g.it was ascertained that the increase of the diameter from 10 to 200 mm caused a decrease of fatigue strength down to 40 - 50%. There are 3 figures and 10 references, 9 of which are Soviet.

ASSOCIATION: Institut mashinovedeniya i avtomatiki Akademii nauk SSSR (Institute of Mechanical Engineering and Automation,AS USSR)

PRESENTED: January 10, 1958, by P.A.Rebinder, Member, Academy of Sciences, USSR

Card 2/2

PODSTRIGACH, YA.S.

PHASE I BOOK EXPLOITATION SOV/4383

Akademiya nauk URSR. Instytut mashynoznavstva ta avtomatyky

Temperaturni napruzhennya v tonkostinnykh konstruktsiyakh (Thermal Stresses in Thin-Walled Structures) Kyyiv, 1959. 173 p. Errata slip inserted. 1,000 copies printed.

Resp. Ed.: M. Ya. Leonov, Doctor of Physics and Mathematics, Professor; Ed. of Publishing House: N. M. Labinova; Tech. Ed.: T. Ya. Mazuryk.

PURPOSE: This collection of articles is intended for technical personnel in the machine industry.

COVERAGE: These articles deal mainly with analyses of temperature fields and thermal stresses in shells and plates. Experimental methods of investigation of the state of stress in machine parts under nonuniformly distributed temperatures are described. No personalities are mentioned. References accompany each article.

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SOV/4383

Thermal Stresses in Thin-Walled Structures

TABLE OF CONTENTS:

The author presents a solution of the problem of determining the state of stress and strains in circular cylindrical and spherical shells under arbitrary nonuniformly distributed temperatures by means of the general theory of shells. He also recommends design methods and discusses boundary conditions.

The author presents results of calculations of thermal stresses in boiler barrels during starting and stopping. The shape of the temperature field of the barrel is determined on the basis of analysis and generalization of results of experimental measurements. All-directional temperature nonuniformities are also taken into consideration. In this case the barrel is treated as a thin shell. The selection of allowable temperature

Card 2/5

differences in the barrel based on stress analysis is also discussed.

Podstrigach, Ya. S. Temperature Field in Walls of Constant Thickness Under an Asymptotic Thermal Régime 109
The author presents a method for determining the temperature field under an asymptotic thermal régime for the case when the boundary temperature values can be presented as polynomials with time. He also gives examples of the temperature distribution across the thickness of plane, cylindrical, and spherical walls.

Podstrigach, Ya. S., and G.V. Plyatsko. State of Stress in a Strip Under Uniform Heating of One of Its Edges 123
The author presents a solution for the problem of the thermoelasticity of an unrestrained long strip with a width considerably exceeding its thickness. The temperature field and the state of stress in the strip are determined for conditions of an asymptotic thermal régime. He also discusses

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the state of stress in a strip caused by local heating of one of the edges.

Plyatsko, G.V. On the Thermal Stresses in a Hollow Cylinder During Heating 132
The author determines the temperature field corresponding to an asymptotic thermal régime in an infinite hollow cylinder when the temperature of the inner wall depends on the polar angle and increases proportionally with time, and the external surface is cooled with a constant-temperature coolant. From the temperature field obtained the thermal stresses are determined.

Chayevs'kyy, M.I. Electronic Instrument for Simultaneous Recording of Stresses and Temperatures in Machine Parts 146
The author describes the construction and operating principle of an electronic instrument for simultaneous recording of stresses and temperatures. The nature of changes in stresses as related to changes in temperature is also discussed.

Card 4/5

Chayevs'kyy, M.I. Experimental Investigation of Stresses in

SOV/179-59-1-13/36

AUTHORS: Podstrigach, Ya. S. and Chayevskiy, M. I. (Lvov)

TITLE: Temperature Stresses Caused by Internal Dissipation of Energy and Their Influence on the Fatigue Strength of Components (O temperaturnykh napryazheniyakh, obuslovlennykh vnutrennim rasseivaniyem energii, i ikh vliyanii na ustalostnuyu prochnost' detaley)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1959, Nr 1, pp 97-102 (USSR)

ABSTRACT: In fatigue testing of components, it is sometimes found that failure occurs at an unusually low stress, and that the failing load may depend on the size of the specimen. In the present paper, the effect of internal friction on the fatigue strength is investigated. Internal friction in a specimen undergoing test leads to the evolution of heat which in turn leads to the development of thermal stresses. Equations are obtained for thermal stresses in a twisted and a bent specimen. It is found that the radial and axial stresses in torsion

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SOV/179-59-1-13/36

Temperature Stresses Caused by Internal Dissipation of Energy and Their Influence on the Fatigue Strength of Components

depend on the size of the specimen and this provides a possible explanation for the observed effect of specimen size on fatigue strength. There are 5 figures and 13 references, 10 of which are Soviet, 2 English and 1 German.

SUBMITTED: February 7, 1958.

Card 2/2

83312

S/179/60/000/004/011/027
E031/E135

16.7300

AUTHOR: Podstrigach, Ya.S. (L'vov)

TITLE: The Influence of Thermo-elastic Energy Dissipation on the Stressed State of a Deformable Body

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1960, No 4, pp 73-78

TEXT: Consider first the stressed and deformed state of an elastic isotropic body under a given system of forces and in an inhomogeneous temperature field. General equations of motion of an elastic medium which take into account the hydrostatic thermo-elastic effect (energy dissipation) suggest, if they permit of a solution, following Papkovich (Ref 7), an expression for the displacement vector in terms of another vector Φ, which can be expressed as the sum of three terms. There is a discussion of the equations for these terms, and the simplifications for the quasi-stationary problem. Suppose now that there are in an infinite space certain factors which are periodic in time causing a definite thermo-elastic state. These factors may be sources of heat distributed in some manner throughout the body, or given body forces.

Card 1/2

PODSTRIGACH, Ya.S. [Podstryhach, IA.S.] (L'vov)

General solution of the nonstationary problem in thermoelasticity. Prykl.mekh. 6 no.2:215-219 '60. (MIRA 13:8)

1. Institut mashinovedeniya i avtomatiki AN USSR.
(Thermal stresses) (Elasticity)

SAVIN, G.N. [Savin, H.M.]; LEONOV, M.Ya.; PODSTRIGACH, Ya.S. [Podstryhach, IA.S.]

Possibilities for generating thermal stresses in a strained body by mechanical means. Prykl.mekh. 6 no.4:445-448 '60. (MIRA 13:11)

1. Institut mekhaniki AN USSR, Kiyev i Institut mashinovedeniya i avtomatiki AN USSR, L'vov.
(Thermal stresses)

KARPENKO, G.V., otv. red.; LEONOV, M.Ya., doktor fiz.-mat. nauk, zam. otv. red.; KRIPYAKEVICH, R.I., kand. tekhn. nauk, red.; MAKSIMOVICH, G.G., kand. tekhn. nauk, red.; PANASYUK, V.V., kand. fiz.-mat. nauk, red.; PODSTRIGACH, Ya.S., kand. fiz.-mat. nauk, red.; STEPURENKO, V.T., kand. tekhn. nauk, red.; TYNNYY, A.A., kand. tekhn. nauk, red.; CHAYEVSKIY, M.I., kand. tekhn. nauk, red.; YAREMA, S.Ya., kand. tekhn. nauk, red.; REMENNIK, T.K., red. izd-va; LISOVETS, A.M., tekhn. red.

[Machines and devices for testing metals] Mashiny i pribory dlia ispytanii metallov. Kiev, Izd-vo Akad.nauk USSR, 1961. 132 p. (MIRA 15:2)

1. Akademiya nauk URSR, Kiev. Instytut mashinoznavstva i avtomatyky. 2. Chlen-korrespondent Akad. nauk USSR(for Karpenko). (Testing machines)

PHASE I BOOK EXPLOITATION SOV/6091

Pidstrygach, Yaroslav Stepanovich, and Stepan Yakymovych Yarmea

Temperaturni napruzhennya v obolonkakh (Thermal Stresses in Shells). Kyyiv, Vyd-vo AN UkrRSR, 1961. 211 p. 450 copies printed.

Sponsoring Agency: Akademiya nauk Ukrayins'koyi RSR. Instytut mashynoznavstva i avtomatyky.

Executive Ed.: M. Ya. Leonov, Doctor of Physics and Mathematics; Ed. of Publishing House: T. S. Mel'nyk; Tech. Ed.: O. M. Lysovets'.

PURPOSE: This book is intended for workers at scientific research institutes, engineers, and engineering students concerned with strength of materials.

COVERAGE: The book is written in two parts. Part I, by Ya. S. Pidstrygach, systematically presents the fundamentals of thermal problems of the linear theory of shells (basic concepts of the

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PODSTRIGACH, Ya. S.

27333

S/021/61/000/002/007/013
D210/D303

24.5400 1045

AUTHOR: Podstrygach, Ya.S.

TITLE: Differential equations of the problem of thermal diffusion in a deformed isotropic solid

PERIODICAL: Akademiya nauk Ukrayins'koyi RSR. Dopovidi, no. 2, 1961, 169 - 172

TEXT: The solid is supposed to be a two-component solid solution. The author considers only small deviations from thermodynamical equilibrium and takes only quadratic terms in the expansion of U. It is stated that the following equations are easy to obtain:

$$\sigma_{ij} = K_{T.c}e + 2\mu(e_{ij} - \frac{1}{3}\delta_{ij}e) - K_{T.c}\,\delta_{ij}(\beta_{\sigma.c}t + \beta_{\sigma.T}c), \quad (1)$$

$$S = \frac{C_{e.c}}{T}t + \beta_{\sigma.c}K_{T.c}e - \frac{C_{\sigma.c}\,\beta_{\sigma.s} - C_{e.c}\,\beta_{\sigma.T}}{\beta_{\sigma.}\,T}c. \quad (2)$$

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The notations are: σ_{ij} - stress tensor; s - entropy; $K_{T.c}$ - isothermal compression modulus at constant concentration; $c_{e.c}$, $c_{\sigma.c}$ - specific heats; $e = e_{ii}$; $\sigma = \sigma_{ii}/3$; e_{ij} - deformation tensor; t - temperature; T - absolute temperature; $\beta_{\sigma.c}$ - temperature coefficient of volume expansion at constant concentration; $\beta_{\sigma.s}$, $\beta_{\sigma.T}$ - adiabatic and isothermal coefficient of volume expansion due to change of concentration. On the basis of Onsager's principle, and neglecting the heat of transport one finds for the flow of the dissolved substance $\bar{I}$ and the heat flow $\bar{I}_q$.

$$\bar{I} = -\rho(D_c \operatorname{grad} c + D_e \operatorname{grad} e + D_t \operatorname{grad} t) \qquad (3)$$

$$\bar{I}_q = -\rho\lambda \operatorname{grad} t,$$

ρ being the density, λ the coefficient of heat conduction, D_c, D_e D_t the diffusion coefficients. From (1) - (3), together with the

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S/021/61/000/002/007/013
D210/D303

Differential equations of the ...

equations of motion, of energy balance and balance of substance one obtains for the vector of displacements $\bar{u}$, the increase of temperature t and concentration c

$$\mu\Delta\bar{u} + \left(K_{T,c} + \frac{1}{3}\mu\right)\operatorname{grad} \operatorname{div}\bar{u} - K_{T,c}(\beta_{\sigma,c}\operatorname{grad} t + \beta_{\sigma,T}\operatorname{grad} c) = \rho\frac{\partial^2\bar{u}}{\partial\tau^2},$$

$$\lambda\Delta t = c_{e,c}\frac{\partial t}{\partial\tau} + \gamma_e\frac{\partial}{\partial\tau}\operatorname{div}\bar{u} + \gamma_c\frac{\partial c}{\partial\tau}, \quad (4)$$

$$D_c\Delta c + D_e \operatorname{div}\Delta\bar{u} + D_t\Delta t = \frac{\partial c}{\partial\tau},$$

where Δ being Laplace's operator,

$$\gamma_e = \frac{c_{\sigma,c} - c_{e,c}}{\beta_{\sigma,c}}, \quad \gamma_c = \frac{c_{e,c}\beta_{\sigma,T} - c_{\sigma,c}\beta_{\sigma,s}}{\beta_{\sigma,c}},$$

(4) can be simplified for the case of damping process after an instantaneous disturbance, by neglecting inertial terms resulting in

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D210/D303

Differential equations of the ...

$$\mu\Delta\bar{u} + \left(K_{s,c} + \frac{1}{3}\mu\right)\operatorname{grad}\operatorname{div}\bar{u} = \frac{K_{s,c} - K_{T,c}}{\beta_{\sigma,c}K_{T,c}}\operatorname{grad} s + \beta_{\sigma,c}K_{s,c}\operatorname{grad} c, \quad (6)$$

and

$$\varkappa_{ss}\Delta s + \varkappa_{sc}\Delta c = \frac{\partial s}{\partial \tau}, \quad \varkappa_{cs}\Delta s + \varkappa_{cc}\Delta c = \frac{\partial c}{\partial \tau}, \quad (7)$$

If the solutions of (7) are knowns the general solution of (6) can be represented in the Papkovich-Neyber, form

$$\bar{u} = \bar{\Phi} - \frac{1}{2}\frac{K_{s,c} + \frac{1}{3}\mu}{K_{s,c} + \frac{4}{3}\mu}(\bar{r}\bar{\Phi} + \Phi_0) + \frac{K_{s,c} - K_{T,c}}{\beta_{\sigma,c}K_{T,c}\left(K_{s,c} + \frac{4}{3}\mu\right)}\operatorname{grad}\psi_s + \quad (8)$$

$$+ \frac{\beta_{\sigma,c}K_{s,c}}{K_{s,c} + \frac{4}{3}\mu}\operatorname{grad}\psi_c,$$

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Φ, Φ_0 being harmonical functions and Ψ_s, Ψ_c particular solutions of

$$\Delta\Psi_s = S, \quad \Delta\Psi_c = C. \tag{9}$$

If there is no diffusion (4), (6), (7) go over into well-known equations of thermal elasticity. The author states that it is easy to generalize the equations for the case of a solid solution with n components. There are 12 Soviet-bloc references.

ASSOCIATION: Instytut mashynoznavstva ta avtomatyky AN URSR (Institute of Science of Machines and Automation, AS UkrSSR)

PRESENTED: by Academician AS UkrSSR, H.M. Savin

SUBMITTED: May 11, 1960

S/185/61/006/005/008/019
D274/D303

AUTHORS: Pidstryhach, Ya.S., and Pavlyna, V.S.

TITLE: General thermodynamical relationships for solid solutions

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 6, no. 6, 1961, 655 - 662

TEXT: A thermodynamic system, represented by a single-phase n-component solid solution, is considered. The principal thermodynamic equation for this system is

$$dU = TdS + \sum_{i=1}^{6} \sigma_i de_i + \sum_{k=1}^{n} \mu_k dc_k. \quad (1)$$

The system is characterized by five groups of thermodynamic constants, namely those relating to elasticity moduli, linear expansion, stress, diffusion and heat capacity. These constants constitute a complete system of physico-mechanical characteristics. By means of these characteristics and equations of type (1), it is possible

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to set up tables of all possible first derivatives of the parameters of the thermodynamic system, as well as tables of the characteristic functions with respect to the independent variables. This is done by the Jacobians method (Ref. 6: F.A. Crawford, Am. J. Phys., 17, 1, 1949). Thus, the derivative $(\partial c_l/\partial T)_{e,\mu}$ can be written as follows:

$$\frac{\partial(c_l, \mu, e, c')}{\partial(T, \mu, e, c')} = \sum_k \frac{\partial(c_l, \mu_k, \mu', e, c')}{\partial(c_l, T, \mu', e, c')} : \frac{\partial(T, \mu_k, \mu', e, c')}{\partial(c_l, T, \mu', e, c')} =$$

$$= -\sum_k \left(\frac{\partial \mu_k}{\partial T}\right)_{e,c} : \left(\frac{\partial \mu_k}{\partial c_l}\right)_{T,e}.$$

Hence, by using a formula involving the constants of the fourth group, one obtains

$$\left(\frac{\partial c_e}{\partial T}\right)_{e,\mu} = -\sum_k \frac{d_{k,T}^{e,c}}{d_{kl}^{T,e}}.$$

Analogously, other derivatives of characteristic functions and sy:

PIDSTRIGACH, YA. S.

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S/185/62/007/006/009/014
D407/D301

18.8100

AUTHORS: Pidstryhach, Ya. S. and Pavlyna, V. S.

TITLE: Diffusion in a non-uniformly heated strained layer in the presence of mass-exchange with the ambient medium

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 7, no. 6, 1962, 652-659

TEXT: The relation between the processes of diffusion, heat conduction and deformation in a binary isotropic solid solution is considered for the case of an infinite layer of thickness 2 l. The differential equations and the boundary conditions for these processes are set up; thereby certain simplifying assumptions are made. The infinite layer is subjected to stretching and bending; it is heated by convection with the ambient medium; an exchange of atoms may take place between layer and medium. The system of equations reduces to two:

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Diffusion in a ...

$$D_c^* \frac{\partial^2 c}{\partial x^2} + D_t^* \frac{\partial^2 t}{\partial x^2} = \frac{\partial c}{\partial \tau}$$

$$K \frac{\partial^2 t}{\partial x^2} = \frac{\partial t}{\partial \tau} \qquad (5)$$

where $K = \lambda/c$ is the coefficient of heat conductivity and D_c^* and D_t^* are the reduced diffusion coefficients. The stress-strain relations are set up. In order to determine the stressed-strained state of the layer, it is necessary to find the distribution $c(x,\tau)$ of the solute and the temperature distribution $t(x,\tau)$. These are obtained by solving system (5) and the corresponding boundary conditions. The formula for $c(x,\tau)$, thereby obtained, is considerably simplified by assuming that the settling time of the thermal regime is considerably smaller than that of the diffusion process.

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Diff[illegible] ...entration

The simplified formula shows that the change in concentration of the solute is a result of 3 different diffusion processes: The first process is due to the difference in chemical potentials, the second to the strain gradient (due to the force P and moment M) and to the strain due to the temperature variation, the third is thermodiffusion. In the case of vacuum evaporation of the solute the obtained formulas are modified (by setting the chemical potentials equal to zero). In a stationary process, the stresses in the layer arise as a result of the external forces only. The strain components consist of three terms; the first is related to the force P and the moment M, and the other two to the diffusion processes and the non-uniform heating. From the strain tensor, corresponding to the state following the removal of the applied load, it is possible to calculate the radius of curvature of the middle surface of the layer; two formulas are obtained for the radius of curvature, corresponding to the residual strain. These formulas can be used in the experimental determination of the physico-mechanical constants of materials.

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D407/D301

Diffusion in a ...

ASSOCIATION: Instytut mashynoznavstva ta avtomatyky AN UkrRSR, L'viv (Institute of the Science of Machines and Automation of the AS UkrRSR, L'viv)

SUBMITTED: January 25, 1962

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PODSTRIGACH, YA. S.

28688

S/021/61/000/009/004/012
D274/D304

24.4200 1103

AUTHOR: Podstrygach, Ya. S.

TITLE: On the conditions for an unstressed thermal state in shells

PERIODICAL: Akademiya nauk UkrSSR. Dopovidi. no. 9, 1961, 1132-1135

TEXT: Using the methods of irreversible thermodynamical processes, thin shells are described by the following relationships:

$$T_1 = \frac{2Eh}{1-\nu^2}(e_1 + \nu e_2) - \frac{2\alpha_t Eh}{1-\nu} T,$$

$$T_2 = \frac{2Eh}{1-\nu^2}(e_2 + \nu e_1) - \frac{2\alpha_t Eh}{1-\nu} T,$$

$$S = T_{12} - k_2 M_{21} = T_{21} - k_1 M_{12} = \frac{Eh}{1+\nu}\omega,$$

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APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001341510019-6"

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$$M_1 = \frac{2}{3}\frac{Eh^3}{1-\nu^2}(\varkappa_1 + \nu\varkappa_2) - \frac{2}{3}\frac{\alpha_t Eh^3}{1-\nu}T^*,$$

$$M_2 = \frac{2}{3}\frac{Eh^3}{1-\nu^2}(\varkappa_2 + \nu\varkappa_1) - \frac{2}{3}\frac{\alpha_t Eh^2}{1-\nu}T^*, \quad (1)$$

$$H = \frac{1}{2}(M_{12} + M_{21}) = \frac{2}{3}\frac{Eh^3}{1+\nu}\tau,$$

where α_t is the coefficient of linear expansion, and

$$T = \frac{1}{2h}\int_{-h}^{h} t\,d\gamma, \quad T^* = \frac{3}{2h^2}\int_{-h}^{h} t\gamma\,d\gamma$$

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On the conditions for ...

For t=0, Eq's (1) transform to the equations for isothermal strain. The purely thermal strain-components are

$$\varepsilon_1^{(t)} = \varepsilon_2^{(t)} = \alpha_t T, \omega^{(t)} = 0, \varkappa_1^{(t)} = \varkappa_2^{(t)} = \frac{\alpha_t}{h} T^*, \tau^{(t)} = 0 \quad (2)$$

The stresses at any point of the shell are

$$\sigma_{11} = \frac{1}{2h}\left(T_1 + 3M_1 \frac{\gamma}{h^2}\right) + \frac{\alpha_t E}{1-v}\left(T + T^* \frac{\gamma}{h} - t\right)$$

$$\sigma_{22} = \frac{1}{2h}\left(T_2 + 3M_2 \frac{\gamma}{h^2}\right) + \frac{\alpha_t E}{1-v}\left(T + T^* \frac{\gamma}{h} - t\right) \quad (3)$$

$$\sigma_{12} = \frac{1}{2h}\left(S + 3H \frac{\gamma}{h^2}\right)$$

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whence it follows directly that for the absence of thermal stresses it is necessary and sufficient that

$$t = T + T^{*}\frac{\zeta}{h} \quad (4)$$

$$T_1 = T_2 = S = 0, \; M_1 = M_2 = H = 0 \quad (5)$$

Thus, determining the conditions for the absence of thermal stresses reduces to ascertaining the conditions for the absence of thermal forces and moments. The necessary and sufficient condition for the absence of thermal forces and moments is the existence of single-valued and continuous, purely-thermal components of the displacement- and shear vectors. The displacements $\bar{u}$ and shears $\bar{\Theta}$ are given by

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On the conditions for ...

$$\bar{u} = \bar{u}_0 + \int_{M_0}^{M} (\bar{u}_{\alpha} d\alpha + \bar{u}_{\beta} d\beta) \quad (6)$$

$$\bar{\theta} = \bar{\theta}_0 + \int_{M_0}^{M} (\bar{\theta}_{\alpha} d\alpha + \bar{\theta}_{\beta} d\beta) \quad (7)$$

where $\bar{u}_{\alpha}$ and $\bar{\theta}_{\alpha}$ and $\bar{\theta}_{\beta}$ are given by expressions involving A, B which are the coefficients of the first quadratic form of the middle surface, and the unit vectors $\bar{e}$, and curvatures k. (6) yields (after integration):

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$$\bar{u} = \bar{u}_0 - \bar{\theta} \times (\bar{r} - \bar{r}_0) + \int_{M_0}^{M} \left\{ \left[\bar{u}_{(\alpha)} - (\bar{r} - \bar{r}_0) \times \bar{\theta}_\alpha \right] d\alpha + \left[\bar{u}_{(\beta)} - (\bar{r} - \bar{r}_0) \times \bar{\theta}_\beta \right] d\beta \right\} \quad (9)$$

The purely-thermal components of displacements and shears are given by

On the conditions for ...

$$\bar{u}^{(t)} = \bar{u}_0^{(t)} - \bar{\theta}^{(t)} \times (\bar{r} - \bar{r}_0) + \alpha_t \int_{M_0}^{M} \left\{ \left[T\bar{e}_1 - (\bar{r} - \bar{r}_0) \times \left(-\frac{1}{h} T^* \bar{e}_2 + \frac{1}{B} \frac{\partial T}{\partial \beta} \bar{e}_n \right) \right] A d\alpha + \left| T\bar{e}_2 - (\bar{r} - \bar{r}_0) \times \left(\frac{1}{h} T^* \bar{e}_1 - \frac{1}{A} \frac{\partial T}{\partial \alpha} \bar{e}_n \right) \right] B d\beta \right\}, \quad (10)$$

$$\bar{\theta}^{(t)} = \bar{\theta}_0^{(t)} + \alpha_t \int_{M_0}^{M} \left[\left(-\frac{1}{h} T^* \bar{e}_2 + \frac{1}{B} \frac{\partial T}{\partial \beta} \bar{e}_n \right) A d\alpha + \left(\frac{1}{h} T^* \bar{e}_1 - \frac{1}{A} \frac{\partial T}{\partial \alpha} \bar{e}_n \right) B d\beta \right].$$

If T^* is a single-valued and continuous function with continuous first derivates, and T - single-valued, continuous and with continuous derivatives (to second-order inclusive), the necessary and sufficient conditions for the existence and independence of

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the integrals entering Eq. (10), yield

$$\frac{\partial T^*}{\partial \alpha} - k_1 h \frac{\partial T}{\partial \alpha} = 0; \quad \frac{\partial T^*}{\partial \beta} - k_2 k \frac{\partial T}{\partial \beta} = 0,$$

$$\frac{h}{AB}\left[\frac{\partial}{\partial \alpha}\left(\frac{B}{A}\frac{\partial T}{\partial \alpha}\right) + \frac{\partial}{\partial \beta}\left(\frac{A}{B}\frac{\partial T}{\partial \beta}\right)\right] + (k_1+k_2)\, T^* = 0 \qquad (11)$$

If the restrictions on T and T^* are removed, or if the middle surface is multiply-connected, expressions for the increments $\bar{u}_L^{(t)}$ and $\bar{\omega}_L^{(t)}$, on traversing the contour L, are obtained. Hence the conditions

$$u_L^{(t)} = 0, \quad \vartheta_L^{(t)} = 0 \tag{13}$$

for any contour L, in conjunction with Eq. (11) are the necessary and sufficient conditions for the absence of thermal stresses and moments. It is noted that the stressed state, corresponding to T and T* which satisfy (11) but do not satisfy (13), can be realized by means of dislocations, whose characteristics are determined from Eq. (10). In the case of the axisymmetric problem for shells of revolution, the general solution of (11) is:

$$T = C_0 + C_1 z + C_2 \left(\int \frac{k_1 + k_2}{k_2^2 r^3} z ds - z \int \frac{k_1 + k_2}{k_2^2 r^3} ds \right)$$

$$T^* = -h \left[C_1 f + C_2 \left(\int \frac{k_1 + k_2}{k_2^2 r^3} f ds - f \int \frac{k_1 + k_2}{k_2^2 r^3} ds \right) \right] \tag{14}$$

where C are arbitrary constants. For t one obtains

$$t = C_0 + C_1 Z + C_2 \left(\int \frac{k_1 + k_2}{k_2^2 r^3} Z ds - Z \int \frac{k_1 + k_2}{k_2^2 r^3} ds \right) \qquad (15)$$

where Z is the coordinate of the point which is at a distance from the point z of the middle surface (Eq. 4). For $C_2=0$, one obtains that the only axisymmetric thermal field which does not call forth stresses in shells of revolution, is a linear field of type $t=C_0+ C_1Z$. There are 5 Soviet-bloc references.

ASSOCIATION: Instytut mashynoznavstva ta avtomatyky AN USSR (Institute of the Sciences of Machines and Automation, AS UkrSSR)

PRESENTED: by Academician G.M. Savin, AS UkrSSR
SUBMITTED: March 3, 1961

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001341510019-6"

S/021/63/000/003/011/022
D405/D301

PIDSTRIGACH

AUTHOR: Pidstryhach, Ya. S.

TITLE: Differential equations of strain diffusion theory of solids

PERIODICAL: Akademiya nauk UkrRSR. Dopovidi. no. 3, 1963, 336-339

TEXT: A continuum is considered, whose thermodynamic state is determined by the strain tensor, the temperature and some physical parameters which form a symmetric tensor of second rank $\hat{c}$ which satisfies the balance equation

$$\mathrm{Div}\,\hat{I}_c + \rho \frac{d\hat{c}}{d\tau} = 0, \quad (\mathrm{Div}\, I_c = \{\nabla_e I^c_{eij}\}) \qquad (2)$$

where $\hat{I}_c$ is a tensor of third rank which represents the flow. The physical interpretation of Eq. (2) may be related to diffusion

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of dislocations or to diffusion in the presence of strain anisotropy. Further differential equations are obtained for the entropy increase and for the rate of change of the internal energy. The formulas for the entropy and for the stress and strain components, together with the linearized differential equations, the equations of motion and Cauchy's relation, form a complete system of differential equations which describe the strained state of the body in the case of small deviations from equilibrium. In the case of isotropic diffusion, the above system passes into a system obtained by the author in an earlier work.

ASSOCIATION: Instytut mashynoznavstva ta avtomatyky AN URSR (Institute of the Science of Machines and Automation of the AS UkrRSR)

PRESENTED: by Academician H. M. Savin of the AS UkrRSR

SUBMITTED: April 14, 1962

PODSTRIGACH, Ya.S. [Pidstryhach, IA.S.]

Generalization of the theoretical model of a solid body. Dop. AN URSR no.8:1015-1018 '63. (MIRA 16:10)

1. Institut mashinovedeniya i avtomatiki AN UkrSSR. Predstavleno akademikom AN UkrSSR S.N. Savinym [Savin, H.M.]. (Solids)

PODSTRIGACH, Ya.S. [Pidstryhach, IA.S.]

Differential equations of the diffusion theory of deformation of a solid. Dop. AN URSR no.3:336-340 '63. (MIRA 17:10)

1. Institut mashinovedeniya i avtomatiki AN UkrSSR. Predstavleno akademikom AN UkrSSR G.N. Savinym [Savin, H.M.].

PODSTRIGACH, Ya.S.; GEMBARA, V.M.

Equations of heat conductivities of anisotropic plates and shells.
Nauch.zap.IMA AN URSR.Ser.mashinoved. 10:56-65 '64.
(MIRA 17:10)

PODSTRIGACH, Ya.S. (L'vov)

Diffusion theory of the inelasticity of metals. PMTF no.2:67-72 Mr-Ap '65. (MIRA 18:7)

PODSTRIGACH, Ya.S. (L'vov); PAVLINA, V.S. (L'vov)

Basic equations of the plane problem of thermal diffusivity.
Prikl. mekh. 1 no.3:101-106 '65. (MIRA 18:7)

1. Fiziko-mekhanicheskiy institut AN UkrSSR.

PODSTRIGACH, Ya.S.; KOLYANO, Yu.M.

Temperature field and thermal stresses in a thin infinite plate heated by heat sources under conditions involving heat transfer. Inzh. fiz. zhur. 7 no.6:72-80 '64. (MIRA 17:12)

1. Institut mashinovedeniya i avtomatiki AN UkrSSR, L'vov.

PODSTRIGACH, Ya.S.; PAVLINA, V.S.

Diffusion processes in a heated strained sphere. Vop. mekh. real'. tver. tela no. 2:100-106 '64. (MIRA 17:9)

BURAK, Ya.I.; PODSTRIGACH, Ya.S.

Moving localized force actions in an unlimited elastic medium. Vop. mekh. real'. tver. tela no. 2:114-124 '64. (MIRA 17:9)

PODSTRIGACH, Ya.S.; SHVETS, R.N.

Dynamic problem in the thermoelasticity of a thin rod taking into consideration heat transfer from its surface. Vop. mekh. real'. tver. tela no. 2:125-134 '64. (MIRA 17:9)

KARPENKO, G.V., otv. red.; LEONOV, M.Ya., doktor fiz.-mat. nauk, prof., red.; MAKSIMOVICH, G.G., kand. tekhn. nauk, red.; PANASYUK, V.V., kand. fiz.-mat. nauk, red.; PODSTRIGACH, Ya.S., kand. fiz.-mat. nauk, red.; STEPURENKO, V.T., kand. tekhn. nauk, red.; TYNNYY, A.N., kand. tekhn. nauk, red.; BURAK, Ya.I., kand. fiz.-mat. nauk, red.; KIT, G.S., kand. fiz.-mat. nauk, red.; ZORIY, L.M., inzh., red.; SOSHKO, A.I., inzh., red.

[Scientific works on the mechanics of materials and the mechanics of elastic solids; annotated reference book for 1951-1961] Nauchnye raboty po mekhanike materialov i mekhanike uprugogo tela; annotirovannyi spravochnik za 1951-1961 gg. Kiev, Izd-vo AN URSR, 1961. 84 p. (MIRA 17:9)

1. Akademiya nauk URSR, Kiev. Instytut mashynoznavstva ta avtomatyky, Lvov. 2. Chlen-korrespondent AN Ukr.SSR (for Karpenko).

PODSTRIGACH, Ya.S.

Diffusion theory of the deformation of an isotropic continuum.
Vop. mekh. real'. tver. tela no. 2:71-99 '64. (MIRA 17:9)

PODSTRIGACH, Ya. S. [Pidstryhach, IA.S.] (L'vov); KOLYANO, Yu.M. [Koliano, IU.M.] (L'vov)

Two-dimensional temperature problem in the theory of elasticity for a semi-infinite plate with a thermal source moving along its edge. Prykl. mekh. 10 no.2:181-189 '64 (MIRA 17:7)

1. Institut mashinovedeniya i avtomatiki AN UkrSSR.

PODSTRIGACH, Ya.S. [Pidstryhach, IA.S.] (L'vov); KOLYANO, Yu.M. [Koliano, IU.M.] (L'vov)

Two-dimensional temperature problem in the theory of elasticity for a semi-infinite plate in the presence of heat transfer from its surfaces. Prykl. mekh. 9 no.4:398-408 '63. (MIRA 16:8)

1. Institut mashinovedeniya i avtomatiki AN UkrSSR.

PODSTRIGACH, Ya.S.

Temperature field in a system of solids conjugated by a thin interstitial layer. Inzh.-fiz.zhur. 6 no.10:129-136 O '63. (MIRA 16:11)

1. Institut mashinovedeniya i avtomatiki AN UkrSSR, L'vov.

S/879/62/000/000/035/088
D234/D308

AUTHORS: Podstrigach, Ya. S. and Shvets, R. N.

TITLE: Axially symmetrical stressed state in an infinite cylindrical shell, due to a moving temperature field

SOURCE: Teoriya plastin i obolochek; trudy II Vsesoyuznoy konferentsii, L'vov, 15-21 sentyabrya 1961 g. Kiev, Izd-vo AN USSR, 1962, 232-236

TEXT: The shell is assumed to be heated by convective heat exchange with a medium moving with a constant velocity v along the axis of the shell. The temperature of the medium is a function of the axial coordinate. The authors introduce a system of coordinates moving with the medium, find the resolvent equation

$$\frac{d^4w}{dx^4} + a_1 \frac{d^2w}{dx^2} + a_2 w = b_1 T - b_2 \frac{d^2T^*}{dx^2} \qquad (7)$$

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and determine the displacements using Fourier transformation:

$$+\frac{(\alpha_2^2+\varepsilon)\cos\alpha_2 x+2a\alpha_2\sin\alpha_2 x}{\alpha_2^2\sqrt{a_1^2-4a_2}\,[(\alpha_2^2+\varepsilon)^2+4a^2\alpha_2^2]}\Bigg\},\quad x>0;$$

$$w(x)=\frac{b_1\varepsilon T_0}{2}\Bigg\{\frac{e^{\varkappa_2 x}}{\varkappa_2 m_2}+\frac{(\alpha_1^2+\varepsilon)\cos\alpha_1 x+2a\alpha_1\sin\alpha_1 x}{\alpha_1^2\sqrt{a_1^2-4a_2}\,[(\alpha_1^2+\varepsilon)^2+4a^2\alpha_1^2]}- \tag{20}$$

$$-\frac{(\alpha_2^2+\varepsilon)\cos\alpha_2 x+2a\alpha_2\sin\alpha_2 x}{\alpha_2^2\sqrt{a_1^2-4a_2}\,[(\alpha_2^2+\varepsilon)^2+4a^2\alpha_2^2]}\Bigg\},\quad x<0.$$

Forces and moments are also determined.

Card 2/2

PODSTRIGACH, Ya.S. [Pidstryhach, IA.S.]; GEMBARA, V.M. [Hembara, V.M.]

Heat conduction equations for plates of variable thickness. Dop. AN URSR no.12:1587-1590 '62. (MIRA 16:2)

1. Institut mashinovedeniya i avtomatiki AN UkrSSR i L'vovskiy gosudarstvennyy universitet. Predstavleno akademikom AN UkrSSR G.N. Svainym [Savin, H.M.].
(Heat—Conduction) (Differential equations)

S/879/62/000/000/019/088
D234/D308

AUTHOR: Podstrigach, Ya. S. (L'vov)

TITLE: Some general problems of the theory of thermoelasticity and thermal conductivity of thin shells

SOURCE: Teoriya plastin i obolochek; trudy II Vsesoyuznoy konferentsii, L'vov, 15-21 sentyabrya 1961 g. Kiev, Izd-vo AN USSR, 1962, 147-152

TEXT: Using the expressions for the free energy per unit area, and its differential, the author obtains the relations

$$N_1 = D_1 \left[\varepsilon_1 + \nu\varepsilon_2 - \alpha_t(1+\nu)T_1\right], \quad M_1 = D_2\left[\varkappa_1 + \nu\varkappa_2 - \frac{\alpha_t}{h}(1+\nu)T_2\right],$$

$$N_2 = D_1 \left[\varepsilon_2 + \nu\varepsilon_1 - \alpha_t(1+\nu)T_2\right], M_2 = D_2\left[\varkappa_2 + \nu\varkappa_1 - \frac{\alpha_t}{h}(1+\nu)T_2\right],$$

$$S_{12} = \frac{1}{2} D_1(1 - \nu)\, \varepsilon_{12}, \quad H_{12} = D_2(1 - \nu)\, \varkappa_{12} \qquad (4)$$

He also derives the equations connected with thermoelastic scattering:

$$\Delta T_1 - \mu_1 T_1 - \mu_2 T_2 - \frac{\partial T_1}{\partial f} - \mu \frac{\partial \varepsilon}{\partial f} = - (\mu_1 t_c^+ + \mu_2 t_c^- 7$$

$$\Delta T_2 - 3(1 + \mu_1) T_2 - \mu_2 T_1 - \frac{\partial T_2}{\partial f} - \mu h \frac{\partial \varkappa}{\partial f} = - 3(\mu_2 t_c^+ + \mu_1 t_c^-) \qquad (9)$$

Together with the equations of motion of a shell element without load, and the geometrical relations, these equations constitute the complete system of the theory of thermoeleasticity of thin shells. The author also gives a summary of previous papers, chiefly his own. There are 12 references.

Card 2/2

PODSTRIGACH, Ya.S.; KRUCHKEVICH, V.Yu.

Forced thermoelastic vibrations in cylindrical and spherical bodies. Nauch.zap.IMA AN URSR.Ser.mashinoved. 9:80-97 '62. (MIRA 15:12)

(Elastic plates and shells—Vibration)
(Thermal stresses)

PODSTRIGACH, Ya.S.; GEMBARA, V.M.

Analyzing solutions of the one-dimensional nonstationary problem of heat conductivity in the presence of small values of the Biot criterion. Nauch.zap.IMA AN URSR. Ser.mashinoved. 7 no.7:154-165 '61. (MIRA 15:1)

(Heat--Conduction)

20

PODSTRIGACH, YA. S.

SOV/6086

PHASE I BOOK EXPLOITATION

Nauchnoye soveshchaniye po teplovym napryazheniyam v elementakh turbomashin. 2d, Kiyev, 1961.

Teplovyye napryazheniya v elementakh turbomashin; doklady nauchnogo soveshchaniya., vyp. 2 (Thermal Stresses in Turbomachine Parts; Reports of the Scientific Conference, no. 2). Kiyev, Izd-vo AN UkrSSR, 1962. 174 p. 1800 copies printed.

Sponsoring Agency: Akademiya nauk Ukrainskoy SSR. Institut mekhaniki.

Resp. Ed.: A. D. Kovalenko, Academician, Academy of Sciences UkrSSR; Ed.: T. K. Remennik; Tech. Ed.: A. M. Lisovets.

PURPOSE: This collection of articles is intended for scientific workers and turbine designers.

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SOV/6086

Thermal Stresses (Cont.)

COVERAGE: The book contains 18 articles dealing with investigations connected with thermal stresses in turbine components. Individual articles discuss thermoelasticity, thermoplasticity, thermal conductivity, and temperature fields. No personalities are mentioned. References accompany 17 articles. The conference recommended broadening the theoretical and experimental investigations of aerothermoelastic and aerothermoplastic problems, the development of investigations of general problems of the theory of thermoelasticity and thermoplasticity based on the thermodynamic principles of reversible and nonreversible processes, the development of effective calculation methods for thermal stresses taking into account plastic deformations and creep in thin- and thick-walled structural members under stationary and nonstationary operating conditions, the development of experimental-research methods for thermometry and tensiometry in connection with modern operational conditions of mechanical structures, and the broadening of investigations of problems in the thermostrength of structures, especially of those operating under conditions of frequent and sharp temperature changes.

Card 2/6

SOV/6086

Thermal Stresses (Cont.)

Card 4/6

SOV/6086

Thermal Stresses (Cont.)

Bobyr', I. S. [Kiyev]. Application of a Network Electrointegrator to Solving Thermal-Conductivity Problems 162

Podstrigach, Ya. S. [L'vov]. On the Diffusion Relaxation of Thermal Stresses 171

AVAILABLE: Library of Congress

SUBJECT: Mechanical Engineering

AD/dk/jk
11-30-62

Card 6/6

S/676/62/009/000/009/010
A001/A101

AUTHORS: Podstrigach, Ya. S., Kruchkevich, V. Yu.

TITLE: Forced thermo-elastic oscillations in cylindrical and spherical bodies

SOURCE: Akademiya nauk Ukrains'koyi RSR. Instytut mashynoznavstva i avtomatyky, L'viv. Nauchnyye zapiski. Seriya mashinovedeniya. v. 9, 1962. Voprosy mashinovedeniya i prochnosti v mashinostroyenii. no. 8, 80 - 97

TEXT: The purpose of this study was the determination of non-stationary temperature fields in hollow cylinders and spheres and the calculation of resulting stresses. The authors determine the temperature field in a hollow body (infinite cylinder, sphere) whose surfaces exchange heat with a surrounding medium of constant temperature in accordance with Newton's law. The temperature of a medium filling up the body varies by a periodic law. Using the equation of heat conductivity and corresponding boundary and initial conditions the general solution of this equation is sought for in the following form:

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$$t_\nu(\rho,\tau) = t_{\nu 0}(\rho) + t_{\nu 1}(\rho)\cos\omega^*\tau + t_{\nu 2}(\rho)\sin\omega^*\tau + t^*_\nu(\rho,\tau) \quad (5)$$

where ρ is dimensionless radial coordinate r/R_2 (R_2 is external diameter of the body); $\nu = 1$ pertains to cylinder, $\nu = 2$ pertains to sphere. After a certain time interval, asymptotic thermal conditions set in and the temperature at any point oscillates with the same period as that of the inner medium, but with a different amplitude and phase shift. Rigorous solutions are found for the case of a hollow cylinder in terms of Tompson functions, and for the case of a hollow sphere in terms of hyperbolic functions. As an example, a practically important case of pipelines in thermal electric power stations is considered, when the outer surface of the cylinder (pipeline) is thermally insulated. The second problem dealt with is the determination of the stressed-strained state of the bodies subjected to forced thermo-elastic oscillations caused by periodic changes of temperature according to the same law (5). To calculate stresses, formulae derived by L. I. Lur'ye ("Prostranstvennyye zadachi teorii uprugosti", Spatial problems of the theory of elasticity, GITTL, 1955) are used. The expressions for radial and tangential stresses are inserted into the equation of equilibrium, and the differential equation obtained for displacements $U_\nu(\rho,\tau)$ is solved.

S/676/62/009/000/009/010
A001/A101

Forced thermo-elastic oscillations in...

Then, using this solution and expressions for stresses given by Lur'ye, the authors derive formulae for radial $\sigma_\rho^{(\nu)}$ and axial σ_z^{ω} stresses. For the latter case, conditions of axial strain are of importance. Two cases, when the cylinder ends are fixed and free, are considered and corresponding formulae for axial stresses are presented. The formulae are considerably simplified when inertia forces can be neglected. Comparing the results with the known Timoshenko's formulae for a quasi-stationary problem, the authors conclude that the formulae derived in the present article represent a generalization of Timoshenko's formulae extended to the case of steady-state conditions of forced oscillations.

SUBMITTED: June 12, 1961

Card 3/3

PODSTRIGACH, Ya.S.; PAVLINA, V.S.

Diffusion processes in a nonuniformly heated layer undergoing deformation. Vop. mekh. real'. tver. tela no.1:67-75 '62. (MIRA 16:1)

(Diffusion) (Heat--Conduction) (Deformations (Mechanics))

PODSTRIGACH, Ya.S.; BURAK, Ya.I.

Determination of special solutions to equations in the theory of elasticity. Vop. mekh. real'. tver. tela no.1:95-100 '62. (MIRA 16:1)

(Elasticity) (Differential equations)

PODSTRIGACH, Ya.S. [Pidstryhach, IA.S.]; PAVLINA, V.S. [Pavlyna, V.S.]

General relations in the thermodynamics of solid solutions.
Ukr. fiz. zhur. 6 no.5:655-663 S-O '61. (MIRA 14:11)

1. Institut mashinovedeniya i avtomatiki AN USSR, g. L'vov.
(Solutions, Solid)
(Thermodynamics)

PODSTRIGACH, Ya.S. [Podstryhach, IA.S.]

Conditions for the lack of thermal stresses in shells. Dop. AN URSR no.9:1132-1135 '61. (MIRA 14:11)

1. Institut mashinovedeniya i avtomatiki AN USSR. Predstavleno akademikom AN USSR G.N.Savinym [Savin, H.M.].
(Thermal stresses)
(Elastic plates and shells)

PODSTRIGACH, YA. S.

37686

S/198/62/008/003/006/008
D407/D301

10.7100

AUTHORS: Podstryhach, Ya.S., and Burak, Ya.Y. (L'viv)

TITLE: On singular solutions of the dynamic problem of thermoelasticity for an infinite medium

PERIODICAL: Prykladna mekhanika, v. 8, no. 3, 1962, 303 - 310

TEXT: The thermoelastic state of an infinite medium is considered, subjected to concentrated periodic forces. The author proceeds from the system of differential equations of thermoelasticity which make allowance for the influence of the strained state on body temperature. The forces, concentrated at one point, are considered as body forces in the limit which act within an infinitely small neighborhood of the point. This makes it possible (by using the δ-function apparatus) to reduce the problem under consideration to solving the system of thermoelastic equations in the presence of the specified forces. The original system of equations is

$$\Delta\vec{u} + (\beta^2 - 1)\,\text{grad div}\,\vec{u} - c_2^2\frac{\partial^2\vec{u}}{\partial\tau^2} - \alpha(3\beta^2 - 4)\,\text{grad}\,t = -\frac{1}{\mu}\vec{F}, \qquad (1.1)$$

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On singular solutions of the ... S/198/62/008/003/006/008
D407/D301

$$\Delta t - \frac{1}{\varkappa}\frac{\partial t}{\partial \tau} - \frac{\gamma}{\varkappa}\frac{\partial}{\partial \tau}\,\mathrm{div}\,\vec{u} = 0 \qquad (1.2)$$

where $\vec{u}$ is the displacement vector; t - the temperature; $\vec{F}$ - the body-force density vector; α - the temperature coefficient of linear expansion; $\varkappa$ - the thermal conductivity; β - the ratio of the velocity v_1 of the longitudinal wave to the velocity v_2. The function $\vec{F}$ is expanded in series near the origin of coordinates. Each of the expansion terms represents the density of body forces corresponding to different types of actions (concentrated moment, shear center, etc.). Formulas are obtained for the displacement vector $\vec{u}$ and the temperature t. If thermoelastic dissipation is neglected, one obtains

$$\vec{u}_n = \frac{1}{4\pi\mu}\frac{(-1)^n}{n!}(\vec{l}\cdot\vec{\nabla})^n\left[\frac{\vec{P}}{r}e^{-i\omega_2 r} + \frac{1}{\omega_2^2}\mathrm{grad}\,(\vec{P}\cdot\vec{\nabla})\frac{1}{r}(e^{-i\omega_2 r} - e^{i\omega_1 r})\right]e^{i(\omega\tau-\varepsilon)}; \qquad (2.19)$$

$$t_n = 0. \qquad (2.19)$$

The point singularities for the case n = 1, are considered in more detail. Thereby one obtains formulas for the center of expansion, for the shear center, and for the concentrated moment. From the for-

Card 2/3

PODSTRIGACH, Yaroslav Stepanovich[Pidstryhach, IA.S.]; YAREMA, Stepan Yakimovich; LEONOV, M.Ya., doktor fiziko-matem. nauk, otv. red.; MEL'NIK, T.S.[Mel'nyk, T.S.], red. izd-va; LISOVETS', O.M.[Lysovets', O.M.], tekhn. red.

[Thermal stresses in shells] Temperaturni napruzhennia v obolonkakh. Kyiv, Vyd-vo Akad. nauk URSR, 1961. 211 p. (MIRA 15:4)

(Elastic plates and shells) (Thermal stresses)

SOV/123-59-15-61942

Translation from: Referativnyy zhurnal. Mashinostroyeniye, 1959, Nr 15, p 400 (USSR)

AUTHOR: Podsushnyy, A.M.

TITLE: On the Most Favorable Distribution of Power Between the Machine and the Turbine of a Combined Marine Engine

PERIODICAL: Tr. Dal'nevost. politekhn. in-ta, 1957, Vol 46, Nr 6, pp 1 - 12

ABSTRACT: The article has not been reviewed.

Card 1/1

IL'IN, A.K., kand. tekhn. nauk; PODSUCHNYY, A.M., kand. tekhn. nauk, dotsent

Design of injector-type steam coolers. Izv. vus. ucheb. zav.; energ. 7 no.9:87-90 S '64.
(MIRA 17:11)

1. Dal'nevostochnyy politekhnicheskiy institut imeni V.V. Kuybysheva. Predstavlena kafedroy sudovykh parovykh dvigateley i ustanovok.

GORBACHEV, I.V., kand.tekhn.nauk, dots.; PODSUSHNYY, A.M., red.

[Analyzing the graphitization process] K analizu protsessa grafitizatsii. Vladivostok, 1959. 8 p. (Vladivostok. Dal'nevostochnyi politekhnicheskii institut. Trudy, vol.52, no.7) (MIRA 14:4)
(Steel—Metallography) (Diffusion hardening)

ACC NR: AP6032584 (N) SOURCE CODE: UR/0143/66/000/009/0073/0078

AUTHOR: Sen', L. I. (Engineer); Podsushnyy, A. M. (Candidate of technical sciences; Docent)

ORG: Far Eastern Politechnical Institute im. V. V. Kuybyshev (Dal'nevostochnyy politekhnicheskiy institut)

TITLE: Hydrodynamic losses of the gas flow during formation of gas-liquid mixture

SOURCE: IVUZ. Energetika, no. 9, 1966, 73-78

TOPIC TAGS: atomization, fuel atomizer, fuel injection, spray nozzle, gas flow, droplet atomization

ABSTRACT: The atomization of liquids by means of a gas stream is used in various technical devices such as nozzles, coolers, reactors, absorbers, etc. Two formulas have been previously derived for the approximate determination of the hydraulic losses in these devices. However, these two formulas account for only the loss due to the energy expended in accelerating the droplets to a given velocity, while the entire pressure loss actually consists of energy used for the deformation of the liquid jet, droplet formation, acceleration of the droplets, the friction of the gas on the surface of the liquid, and displacement of the liquid film. Therefore, in the present study, experiments were made to take into account these other factors. An assembly was used in which an air stream entering through a diffusor atomomizes the liquid (water) which is injected through radial orifices (0.3—3 mm in diameter) into the

Card 1/2

UDC: 532.501.312+533.27

PODSUSHNYY, A.M., kand.tekhn.nauk, dots.; MAROCHEK, V.I., red.

[Economic indexes of steam power systems] K voprosu o pokazateliakh ekonomichnosti parosilovykh ustanovok. Vladivostok, 1959. 16 p. (Vladivostok. Dal'nevostochnyi politekhnicheskii institut. Trudy, Vol. 52 no.3) (MIRA 14:4)

(Boilers, Marine)

POKROVSKAYA, V.M., kand.tekhn.nauk; PODSUSHNYY, A.M., otv.red.

[Strength of machine taps] Stoikost' mashinnykh metchikov. Vladivostok, 1959. 8 p. (Vladivostok. Dal'nevostochnyi politekhnicheskii institut. Trudy, vol.52, no.9) (MIRA 14:4)

(Taps and dies)

KOMISSAROV, V.I., kand.tekhn.nauk, dots.; PODSUSHNYY, A.M., red.

[Errors in adjustment and their effect on the accuracy of the reciprocal location of coaxial and conjugated holesin machining body parts on boring machines] Pogreshnosti ustanovki i ikh vliianie na tochnost' vzaimnogo raspolozheniia soosnykh i sopriazhennykh otverstii pri obrabotke korpusnykh detalei na rastochnykh stankakh. Vladivostok, 1959. 13 p. (Vladivostok. Dal'ne-vostochnyi politekhnicheskii institut. Trudy, vol.52, no.5) (MIRA 14:4)
(Machine-shop practice) (Drilling and boring)

AID P - 5503

Subject : USSR/Aeronautics - radio

Card 1/1 Pub. 135 - 20/26

Authors : Sheyndlin, L. B., Eng.-Captain and Podsvirov, A. S., Sen. Technician-Lt.

Title : Are the safety fuzes necessary?

Periodical : Vest. vozd. flota, 3, 75-76, Mr 1957

Abstract : The authors suggest that in the interest of reliable operation of airborne radio equipment, particularly of such on fighter planes, the safety fuzes should be excluded from the circuit of the radio equipment.

Institution : None

Submitted : No date

BALKOV, P.P.; DASHEVSKIY, T.B.; KOVAL', V.A.; LIKHNITSKIY, G.V.; PODSVYADEK, A.V.

Electric tensometer-equipped scales. Izm.tekh. no.10:17-20 O '61. (MIRA 14:11)

(Scales (Weighing instruments))