LIBOV, S.L.

USSR/Medicine - Heart Surgery

Card : 1/1

Authors : Kupryanov, P. A., Act. Memb. of Acad. of Med. Sciences USSR, and Libov, S. L., Cand. of Med. Sciences

Title : Heart Surgery

Periodical : Nauka i Zhizn', 6, 26 - 28, June 1954

Abstract : The authors describe the difficulties involved in the delicate work of heart surgery. The progress made during the past 15 years in cardial medicine and surgery especially are discussed. The work on the development of methods for surgical intervention in cases of angina pectoris, and the replacement of a weak heart by a healthy one transplanted from another organism are discussed. Illustrations.

Institution : Academy of Medical Sciences USSR

Submitted : ....

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929820(

LIBOV, S.L., dotsent; BURAKOVSKIY, V.I., kandidat meditsinskikh nauk

Syndrome of cardiopulmonary disorders in open pneumothorax; data on adaptation mechanisms in widely open pneumothorax. Khirurgiia no.8:27-32 Ag '54. (MLRA 7:11)

1. Iz Voyenno-meditsinskoy akademii imeni S.M.Kirova.
(PNEUMOTHORAX, ARTIFICIAL, complications,
cardiopulm. synd., adaptation mechanism in open pneumothorax)
(HEART,
cardiopulm. synd. in open pneumothorax)
(LUNGS, diseases,
cardiopulm. synd. in open pneumothorax)

LIBOV. S. L.

LIBOV, S.L., dotsent (Leningrad, 9, Klinicheskaya, 2, kv. 2);
SHIRYAYEVA, K.F. (Leningrad, Plekhanova, 14, kv.28)

Certain vascular changes in congenital cyanotic heart diseases.
Vest. khir. 74 no.4:21-26 Je '54. (MLRA 7:7)

1. Is 2-y fakul'tetskoy khirurgicheskoy kliniki (nach. prof. P.A. Kupriyanov) i kliniki detskikh bolezney (nach. prof. M.S.Maslov) Voyenno-meditsinskoy akademii im. S.M.Kirova.
(CARDIOVASCULAR DEFECTS, CONGENITAL,
*cyanotic vasc. changes in)
(BLOOD VESSELS, in various diseases,
*congen. cyanotic heart dis.)

LIBOV, S.L.

Summaries of papers presented at the XXVI Congress of Surgeons of the USSR, Moscow, 20 - 27 January 1955, included:

Surgical Treatment of Some Diseases of the Heart and Pericardium.

S. L. LIBOV

SOURCE: [redacted]-A-46013 (Official Publication) Unclassified.

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929820(

LIBOV, S.L.; SHIRYAYEVA, K.F.

Peculiarities of the course and treatment of adhesive pericarditis in children. Pediatriia no.3:3-9 My-Je '55 (MLRA 8:10)

1. Iz 2-y kliniki fakul'tetskoy khirurgii Voyenno-meditsinskoy akademii imeni S.M.Kirova(nach.prof.P.A.Kupriyanov) i kliniki detskikh bolezney Voyenno-meditsinskoy akademii imeni S M Kirova (nach,prof. M.S.Maslov)

(PERICARDITIS, ADHESIVE, in infant and child clin.aspects & indic.for surg.)

KUPRIYANOV, P.A., professor; LIBOV, S.L., professor, (Leningrad)

"Congenital defects of the heart and large vessels." I. Littman, R. Fono. Reviewed by P.A. Kupriianov, S.L. Libov. Khirurgiia no.8: 80-81 Ag. '55. (MLRA 9:2)

1. Deystvitel'nyy chlen Akademii meditsinskikh nauk SSSR.
(HEART--ABNORMITIES AND DEFORMITIES)
(BLOOD VESSELS--ABNORMITIES AND DEFORMITIES) (LITTMAN, I.)

LIBOV, S.L., professor; BURAKOVSKIY, V.I., kandidat meditsinskikh nauk; GUBLER, Ye.V., dotsent; AKIMOV, G.A., kandidat meditsinskikh nauk; SHIRYAYEVA, K.F.

Hypothermia in cardiac surgery. Vest.khir. 76 no.7:24-35 Ag '55. (MLRA 8:10)

1. Iz 2-y fakul'tetskoy khirurgicheskoy kliniki (nach-prof. P.A. Kupriyanov), kafedra patologicheskoy fiziologii (nach-prof. I.P.Petrov), nervnykh bolezney (nach-prof. S.I.Karchikyan) i kliniki detskikh bolezney (nach.-prof. M.S.Maslov) Voyenno-meditsinskoy ordena Lenina akademii im. S.M.Kirova.

(BODY TEMPERATURE
hypothermia in surg. of heart)
(HEART, surg.
controlled hypothermia in)

LIBOV, S.L.

KEVESH, Ye.L., doktor meditsinskikh nauk; LIBOV, S.L., professor.

Chronic atelectasis of inflammatory nature in the middle lobe of the right lung (middle lobe syndrome). Vest.khir.76 no.9: 33-38 O '55. (MLRA 9:1)

1. Iz 2-y fakul'tetskoy khirurgicheskoy kliniki (nach.P.A. Kupriyanov) Voyenno-meditsinskoy ordena Lenina akademii im. S.M.Kirova.
(LUNGS, dis.
middle lobe synd.,clin.aspects, diag. & ther.)

LIBOV, S.L.

[Studies in chest surgery in children] Ocherki grudnoi khirurgii detskogo vozrasta. Kuibyshev, Kuibyshevskoe knizhnoe izd-vo, 1957. 229 p. (MIRA 11:6)

(CHILDREN--SURGERY) (CHEST--SURGERY)

LIBOV, S.L., professor; SHIRYAYEVA, K.F.

Postoperative hyperthermic syndrome. [with summary in English, p. 149]
Khirurgiia, 33 no.1:26-30 Ja '57 (MIRA 10:4)

I. Iz fakul'tetskoy khirurgicheskoy kliniki (zav.-prof. S.L. Libov)
Kuybyshevskogo meditsinskogo instituta.
(SURGERY, OPERATIVE, complications,
postop. fever) (Rus)
(FEVER,
postop.) (Rus)

LIBOV, S.

Surgical treatment of chronic aspecific suppurations of the lungs in children. Khirurgiia, Sofia 10 no.4:297-303 1957.

1. Vissh meditsinski institut - Gr. Kuibishev Katedra po fakultetska khirurgiia Zav katedrata: prof. S. Libov.

(LUNG DISEASES, in inf. & child
chronic aspecific suppurations, surg. (Bul))

LIBOV, S.L., professor; SHIRYAYEVA, K.F.

Diagnosis and treatment of congenital heart defects in children.
Sov.med. 21 no.4:21-28 Ap '57. (MIRA 10:7)

1. Iz kliniki fakul'tetskoy khirurgii (zav. - prof. S.L.Libov)
Kuybyshevskogo meditsinskogo instituta i somaticheskogo otdeleniya
(zav. K.F.Shiryayeva) 2-y gorodskoy detskoy bol'nitsy.
(CARDIOVASCULAR DEFECTS, CONGENITAL
diag. & ther. in child.)

LIBOV, S.L., professor (Kuybyshev, Chernorechenskaya, d.1, kv.47);
SHIRYAYEVA, K.F.

Valvular stenosis of the pulmonary artery; diagnosis and treatment [with summary in English, p.158]. Vest.khir. 78 no.5:45-52 My '57. (MIRA 10:7)

1. Iz khirurgicheskoy kliniki usovershenstvovaniya vrachey (nach. - prof. P.A.Kupriyanov) i kliniki detskikh bolezney (nach. - prof. M.S.Maslov) Voyenno-meditsinskoy ordena Lenina akademii im. S.M. Kirova.

(PULMONARY STENOSIS
diag. & ther.)

LIBOV, S.L.

LIBOV, S.L., prof. (Kuybyshev, Chernorechenskaya ul., d.1, kv.47)

Peculiarities of thoracic surgery in children [with summary in English]. Vest.khir. 79 no.9:16-23 S '57. (MIRA 10:11)

1. Iz kliniki usovershenstvovaniya vrachey (nach. - prof. P.A. Kupriyanov) Voyenno-meditsinskoy ordena Lenina akademii im. S.M. Kirova i kliniki fakul'tetskoy khirurgii (zav. - prof. S.L.Lyubov) Kuybyshevskogo meditsinskogo instituta.
(THORAX, surg.
in child.)

LIBOV, S.L.; KEVESH, Ye.L.; SHIRYAYEVA, K.F.

Recognition and treatment of primary tumor of the heart. Grud. khir. 1 no.1:101-106 Ja-F '59. (MIRA 13:6)

1. Iz detskogo otdeleniya (zav. K.F. Shirayeva) kliniki fakul'tetskoy khirurgii (zav. - prof. S.L. Libov) i kafedry rentgenologii i radiologii (zav. - prof. Ye.L. Kevesh) Kuybyshevskogo meditsinskogo instituta.

(HEART--TUMORS)

LIBOV, S.L., prof.; LEVINA, Z.I.

Surgery in bilateral chronic pulmonary diseases [with summary in English]. Khirurgiia 35 no.1:13-19 Ja '59. (MIRA 12:2)

1. Iz fakul'tetskoy khirurgicheskoy kliniki (zav. - prof. S.L. Libov) Kuybyshevskogo gosudarstvennogi meditsinskogo instituta (dir. D.A. Voronov).
(PNEUMONECTOMY,
in various dis.
bilateral pulm. dis. (Rus))

TON TKHAT TUNG, prof. (Khanoy, V'yetnam); LIBOV, S.L., prof. (Kuybyshev, SSSR) (Kuybyshev (obl.), Chernorechenskaya ul., d.1, kv.47)

Surgery in the Democratic Republic of Vietnam. Vest.khir. 83 no.10: 144-149 O '59. (MIRA 13:2)
(SURGERY)

LIBOV, S.L.; IVANOVA, V.D. (Kuybyshev(obl.),ul.Molodogvardeyskaya,d.50,kv.1)

Surgical methods for the improvement of coronary blood circulation.
Grud. khir. 2 no.5:16-21 S-O '60. (MIRA 16:5)

1. Iz kliniki fakul'tetskoy khirurgii (zav. - prof. S.L.Libov) Kuybyshevskogo meditsinskogo instituta (dir. D.A.Voronov).
(CORONARY HEART DISEASE) (HEART--SURGERY)

LIBOV, S.L., prof.; YERINTSEVA, Ye.P., ordinator

Surgery in chronic pulmonary suppuration in children. Kaz. med. zhur. no. 4:27-30 Jl-Ag '60. (MIRA 13:8)

1. Iz kliniki fakul'tetskoy khirurgii (zav. - prof. S.L. Libov) kuybyshevskogo meditsinskogo instituta.
(LUNGS--ABSCESS) (LUNGS--SURGERY)

LIBOV, S.L., prof.; SHIRIAEVA, K.F., k.m.n.

On chronic suppurations of the lungs in anomalies of the large vessels.
Khirurgiia, Sofia 13 no.11:929-935 '60.

1. Meditsinski institut, gr. Kuybishev. Katedra po fakultetska khirurgiia, Detsko otdelenie. Zav. katedrata: prof. S.L.Libov; Zav. detskoto otdelenie: k.m.n. K.F.Shiriaeva.

(HEART DEFECTS CONGENITAL compl)
(LUNG ABSCESS etiol)

LIBOV, S.L.

Should thoracic surgery be taught in medical institutes? Khirurgiia 36 no.1:115-117 Ja '60. (MIRA 13:10)
(CHEST--SURGERY)

LIBOV, S.L., prof.; KALUZHSKIKH, V.N., kand. med. nauk

Use of intubation anesthesia in the surgical clinic. Sov. med. 25 no.11:56-61 N '61. (MIRA 15:5)

1. Iz kliniki fakul'tetskoy khirurgii (zav. - prof. S.L.Libov) Kuybyshevskogo meditsinskogo instituta (dir. - kand.med.nauk D.A. Voronov).

(INTRATRACHEAL ANESTHESIA)

LIBOV, S.L. (Minsk, ul. Very Khorunzhey, d. 5a, kv.17) ; SHIRYAYEVA, K.F.

Chronic pulmonary diseases in congenital abnormalities of the heart and large vessels. Grudn. khir. 4 no.5:72-80 S-O'62 (MIRA 17:3)

1. Iz kliniki grudnoy khirurgii i anesteziologii (zav. - prof. S.L. Libov) Belorusskogo instituta usovershenstvovaniya vrachey (rektor - kand. med. nauk N. Ye. Savchenko).

LIBOV, Sergey Leonidovich; GUTKOVSKAYA, O., red.; STEPANOVA, N., tekhn. red.

[Errors and complication in heart and lung surgery] Oshibki i oslozhneniia v khirurgii serdtsa i legkikh. Minsk, Gosizdat BSSR, 1963. 211 p. (MIRA 16:8)
(HEART—SURGERY) (LUNGS—SURGERY)
(SURGERY—COMPLICATIONS AND SEQUELAE)

LIBOV, S.L.; ROKITSKIY, M.R.; RUBANOVICH, G.L. (Kuybyshev (obl.), ul. Galaktinovskaya, d. 179, kv.2)

Characteristics of respiratory disorders during some stages of intrathoracic operations. Grund. khir. 5 no.4:55-61 Jl-Ag'63 (MIRA 17:1)

1. Iz fakul'tetskoy khirurgicheskoy kliniki (zav. - prof. S.L.Libov) Kuybyshevskogo meditsinskogo instituta.

LIBOV, S.L., prof.; RUBANOVICH, G.L.

Importance of the investigation of external respiration in the surgery of lung abscesses. Zdrav.Bel.9 no.2:3-7 F'63.
(MIRA 16:7)

1. Kafedra grudnoy khirurgii Belorusskogo gosudarstvennogo instituta dlya usovershenstvovaniya vrachey i otdeleniye torakal'noy khirurgii 2-y klinicheskoy bol'nitsy g. Minska (zav.kafedroy prof. S.L.Libov, glavnyy vrach - B.V.Drivotinov).
(LUNGS—ABSCESS) (LUNGS—SURGERY)
(RESPIRATION)

LIBOV, [illegible], prof. ([illegible], ul. Vory Khoruzhey, d. 5[illegible], kv. 7[illegible] [illegible], V. P.

Chronic lung disease following the aspiration of foreign bodies. Vest. khir. 91 no. 9:19-24 S '63. ([illegible] 17:4)

1. Iz kafedry grudnoy khirurgii (zav. - prof. [illegible] Libov) Belorusskogo instituta usovershenstvovaniya vrachey.

S/020/62/145/005/006/020
B104/B102

AUTHORS: Bakhshiyev, N. G., Girin, O. P., and Libov, V. S.

TITLE: Relations between observed and true absorption spectra in a condensed medium

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 145, no. 5, 1962, 1025-1027

TEXT: Investigation of the relation between the molecular absorption coefficient $\varepsilon(\nu)$ of a substance (or the coefficient $K(\nu)$ in Bouguer's law) and the Einstein absorption coefficient $B(\nu)$ leads to

$$B(\nu) = \varepsilon(\nu)\frac{n(\nu)\,c}{h\nu}\frac{E^2_{cp}(\nu)}{E^2_{э\phi\phi}(\nu)} = \varphi(\nu)\frac{\varepsilon(\nu)\,c}{h\nu}. \qquad (8),$$

where $n(\nu)$ is the refraction coefficient of the medium, E_{cp} the mean macroscopic field of the lightwaves in the dielectric, $E_{э\phi\phi}$ the effective microfield of the lightwaves, $\varphi(\nu)$ an arbitrary function. From this equation it was concluded that the spectral course of the experimentally determined quantity $\varepsilon(\nu)$ of a condensed medium does not agree with the true spectral

S/051/63/014/004/005/026
E039/E420

AUTHORS: Bakhshiyev, N.G., Girin, O.P., Libov, V.S.

TITLE: The relation between the observed and true absorption spectra of molecules in a solid medium. 1. Universal influence of the effective (internal) field

PERIODICAL: Optika i spektroskopiya, v.14, no.4, 1963, 476-483

TEXT: A more precise understanding of the dependence of the experimental values of absorption coefficient $K(\nu)$ on frequency ν is of major importance in spectroscopy. The true absorption spectrum of molecules follows the form calculated from the Einstein coefficient of absorption $B(\nu)$, but when the investigated molecules are in a solid body the observed spectrum $K(\nu)$ and true spectrum $B(\nu)$ can differ in position, intensity and shape of bands. This difference has negligible dependence on the universal effect which is connected with the change in intensity of the light waves acting on the molecules in a dielectric (the effective or internal field) and determines the form of the frequency dependence. A simple theory is constructed which accomplishes the transition from experimental to true spectra by the calculation of a complex tensor parameter of the effective field, which completely determines

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929820(

S/051/63/014/004/005/026
E039/E420

The relation between ...

the value and spectral path of the correction. The theory is based on the relation between quantum and classical parameters characterized by absorption on the one hand and experimental values on the other. This enables the relation between values of K(ν) and B(ν) to be determined for the case of anisotropically polarized molecules and for isotropically absorbing media (liquid, solutions, amorphous solids). A new and more accurate expression is obtained for determining the integral of the intensity of absorption bands from experimental data.

SUBMITTED: August 20, 1962

Card 2/2

L 9852-63 EWT(1)/FCC(w)/BDS--AFFTC/ASD/ESD-3--IJP(C) 57

ACCESSION NR: AP3000580 S/0051/63/014/005/0634/0638

AUTHOR: Bakhshiyev, N. G.; Girin, O. P.; Libov, V. S.

TITLE: Relation between the observed and true absorption spectra of molecules in the condensed state. 2. Method of determining the correction for the universal influence of the effective (internal) field

SOURCE: Optika i spektroskopiya, v. 14, no. 5, 1963, 634-638

TOPIC TAGS: absorption spectra, internal fields

ABSTRACT: In earlier contributions by the authors (Doklady AN SSSR, 145, 1025, 1962; Opt. i spektr., 14, 28, 1963) it was pointed out that the true absorption spectrum of molecules is the frequency variation of the Einstein absorption coefficient B, and then when the molecule is in a condensed state the observed spectrum, characterized by the usual coefficient K, differs from the true spectrum. Accordingly in the present paper there are developed methods for determining the magnitude and frequency dependence of the correction to the observed spectrum due to the universal influence of the effective (internal) field of the molecule. It is demonstrated that the requisite relationships

Card 1/2

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929820(

L 9852-63
ACCESSION NR: AP3000580

0

between the optical characteristics of an isotropic absorbing medium and the microscopic characteristics of the absorbing molecule (the polarizability and effective field tensors) can be found in several ways, two of which are considered in some detail. The first is based on use of the general expression for polarization of an absorbing dielectric; the second consists in seeking the relation between the quantum mechanical and classical quantities characterizing the absorptive capacity of the molecule in a condensed medium. Expressions for determining the effective field and other parameters of molecules in different media from experimental data are adduced. Orig. art. has: 23 equations.

ASSOCIATION: none

SUBMITTED: 20Aug62 DATE ACQ: 12Jun63 ENCL: 00

SUB CODE: PH NR REF SOV: 005 OTHER: 002

Card 2/2 nh/jp

L 11162-63 EWP(j)/EWT(1)/EWT(m)/BDS--AFFTC/ASD--Pc-4--RM
ACCESSION NR: AP3002782 S/0051/63/014/006/0745/0750

60
59

AUTHOR: Bakhshiyev, N. G.; Girin, O. P.; Libov, V. S.

TITLE: Relation between the observed and true absorption spectra of molecules in a condensed medium. 3. Taking into account the influence of the effective (internal) field according to the Lorentz and Onsager-Boettcher models.

SOURCE: Optika i spektroskopiya, v. 14, no. 6, 1963, 745-750

TOPIC TAGS: molecular absorption, true spectra, Onsager-Boettcher model, Lorentz model

ABSTRACT: The present work is concerned with the problem of determining the relation between the observed and true absorption spectra of molecules in a condensed medium in the framework of the Lorentz and Onsager-Boettcher models for the molecule plus medium (solvent) system). In earlier papers (Optika i spektro., 14, 28, 1963 and Doklady AN SSSR, 145, 1025, 1962) the authors derived a general equation for the true absorption spectrum in terms of the observed spectrum, the correction for the universal influence of the effective (internal) field, the components of the tensor of the effective field parameter, and the direction cosines of the dipole moment of the transition. In the present paper, specific but generally applicable calculations are performed for the case of isotropically polarizing

L 11162-63
ACCESSION NR: AP3002782

absorbing molecules. It is shown that, depending on the properties of the molecule and medium, there may occur different phenomena which may distort the true spectrum: shift the bands and alter their intensity and shape. The specific case of the absorption in the region of the fundamental frequency of a hypothetical liquid molecule is examined and the effect of corrections of the effective field according to the Lorentz and Onsager-Boettcher theories is shown. It is predicted that appreciable changes may be expected in the electronic spectra of strongly absorbing substances, such as dyes. It is pointed out that failure to allow for the distorting effects of various factors may lead to serious errors in interpreting experimental spectra. The authors plan to discuss the properties of some particular substances and systems in future contributions. Orig. art. has: 26 formulas and 2 figures.

ASSOCIATION: None

SUBMITTED: 20Aug62 DATE ACQD: 15Jul63 ENCL: 00

SUB CODE: 00 NO REF SOV: 005 OTHER: 005

cs/

Card 2/2

63

L 12834-63 EWP(j)/EPF(c)/EWT(m)/BDS Pr-4/Pc-4 RM/WW

ACCESSION NR: AP3002219 S/0020/63/150/006/1256/1259

AUTHOR: Bakhshiyev, N. G.; Girin, O. P.; Libov, V. S.

TITLE: Apparent and true absorption spectra of liquid $CHCl_3$ and CCl_4 in the 740-810 cm^{-1} range

SOURCE: AN SSSR. Doklady*, v. 150, no. 6, 1963, 1256-1259

TOPIC TAGS: absorption spectra, $CHCl_3$, CCl_4, absorption coefficient

ABSTRACT: The authors presented in a previous paper (DAN, 145, 1962, 1025) the relationship between the observed molecular absorption coefficients and the true (Einstein's) coefficients which are determined by the internal properties of the molecule. The correction factor is given by the changes of the electric field of the light wave caused by the medium. In the present work this correction is used for obtaining the real absorption coefficients of the spectrum which corresponds to the fundamental vibration of C-Cl. The absorption spectrum of $CHCl_3$ and CCl_4 in both the liquid and gaseous state were experimentally obtained and corrected according to the mentioned formulas.

Card 1/2

L 12834-63
ACCESSION NR: AP3002219

0

The observed and the corrected spectra absorption coefficients are given in two figures. The results confirm the conclusions of the quoted paper that the observed absorption spectra differ greatly from the true ones. This report was presented by Academician A. N. Terenin, 18 Jan 63. Orig. art. has: 3 formulas, 2 figures and 2 tables.

ASSOCIATION: none

SUBMITTED: 04Jan63 DATE ACQ: 24Jul63 ENCL: 00

SUB CODE: PH, EL NO REF SOV: 002 OTHER: 004

Card 2/2

LIBOV, V.S.; BAKHSHIYEV, N.G.

Quantitative study of the absorption and dispersion of $CHCl_3$ and CCl_4 in the region of strong infrared absorption bands. Opt. i spektr. 16 no.2:223-227 F '64. (MIRA 17:4)

LIBOV, V.S.; BAKHSHIYEV, N.G.; GIRIN, O.P.

Relation between the observed and true molecular absorption spectra in a condensed medium. Part 4. Opt. i spektr. 16 no.6:1016-1023 Je '64. (MIRA 17:9)

1. LIBOV, YA. V.

2. USSR (600)

4. Grinding and Polishing

7. Fixture for grinding grooves in bushings of small inside diameter.
Stan. i instr. D '52.
9500 17

9. Monthly List of Russian Accessions, Library of Congress, March 1953. Unclassified.

LIBOV, Ya. V. (Eng.); KAPUSTIN, F. D. (Eng.);

XI. " The Use of Unit Machine Tools in Small-lot Production of Instruments," *Automation and Mechanization of Production Processes in Instrument Manufacturing*, Mosocw, Mashgiz, 1958. 591 p.

PURPOSE: This book is intended for engineers, technicians, and scientific personnel concerned with mechanization and automation of production processes in instrument manufacturing, and for students and teachers of this subject in vuzes.

Li'BOV YE. A.

GREBEN', I.I.; LARIN, V.T.; PERFILOV, M.A.; LIBOV, Ye.A.; VORONETSKAYA, L.V., tekhnicheskiy redaktor.

[The PES-50 mobile diesel electric power generator] Peredvizhnaia dizel'naia elektrostantsiia PES-50. Moskva, Goslesbumizdat, 1951. 150 p. [Microfilm] (MLRA 7:11)

(Dynamos) (Diesel engines)

LIBOV, Ye.A.

Reducing the length of protective sheathing. Stroi. truboprov. 9 no.5:30 My '64. (MIRA 17:9)

1. Filial Gosudarstvennogo instituta po proyektirovaniyu magistral'nykh truboprovodov, Kiyev.

FEDOROVICH, Ye.G.; LIBOV, Ye.F.

Use all means to develop the creative initiative of telecommunication workers. Vest. sviazi 24 no.9:25-26 S '64. (MIRA 17:11)

1. Zamestitel' nachal'nika Tekhnicheskogo upravleniya Ministerstva svyazi SSSR (for Fedorovich). 2. Nachal'nik otdela izobreteniy Tekhnicheskogo upravleniya Ministerstva svyazi SSSR (for Libov).

SOKOLOVSKAYA, A.P.; CHERNOVA, I.A.; LIBOVA, E.Ye.

Epidemiology and clinical aspects of aborted and anicteric forms of infectious hepatitis. Nauch. inform. Itd. nauch. med. inform AMN SSSR no.1:28-29 '61 (MIRA 16:11)

1. Institut infektsionnykh bolezney (direktor - chlen - korrespondent AMN SSSR prof. I.L.Bogdanov) AMN SSSR, Kiyev.

*

LIBOVA, I., MUDr.

Work of the community health physician in the fields of hygiene and epidemiology. Cesk. zdrav. 11 no.4:160-161 '63.

1. Okresni hygienik, OUNZ Pisek.
(EPIDEMIOLOGY) (HYGIENE) (PHYSICIANS)

SESTAK, B.; LIBOVICKY, S.

[redacted]

Dislocations in Fe-3% Si alloy single crystals deformed at a higher rate. Chekhosl fiz zhurnal 13 no.4:266-271 '63.

1. Fyzikalni ustav, Ceskoslovenska akademie ved, Praha.

LIBOVICKY, Vaclav

Development of the socialist competition of air crews of the Czechoslovak Air Lines. Letecky obzor 6 no.8:245 '62.

LIBRA, A.

Equipment for preventing operational breakdowns caused by ice.

p. 46 (Prague. Statni ustav pro projektovani energetickych zavodu a zarizeni. Technicke Zpravy. No. 3, 1956, Praha, Czechoslovakia)

Monthly Index of East European Accessions (EEAI) LC. Vol. 7, no. 2, February 1958

PODHORA, Jiri, inz.; LIBRA, Otakar, inz.

Use of the 11 523.1 material for pressure vessels. Zvaranie 12 no.7:189-194 Jl '63.

1. Kralovopolska strojirna, n.p., Brno.

LIBRA, Otakar, inz.; PODHORA, Jiri, inz.

Use of the 11 483.1 material for pressure vessels. Zvaranie 12 no.9:245-252 S'63.

1. Kralovopolska strojirna, n.p., Brno.

KVIZDA, Vladimir, inz.; LIBRA, Otakar, inz.

Brno International Fair 1964. Zvaranie 13 no.7:220-223 [illegible] '64.

1. Kralovopolska strojirna, Brno.

LIBRA, Otakar, inz.

Cutting of hardly cuttable materials by the VUS arg ORS equipment. Zvaranie 13 no.11:324-327 N '64.

1. Kralovopolska strojirna, Brno.

LIBRENJAK, K.

SKRIVANELI, N.; PANSINI, K.; FISER-HERMAN, M.; TIEFENBACH, A.; LIBRENJAK, K.; PETROVACKI, M.; MAJNARIC, D.; SVEL, I.

Clinical and biochemical findings in rachitis. Acta med. iugosl. 10 no.3:337-356 1956.

1. Klinika za djecje bolesti Medicinskog fakulteta u Zagrebu i Zavod za klinicku kemiju Farmaceutskog fakulteta u Zagrebu.
(RICKETS, metabolism,
(Ser))

R/008/62/013/003/004/006
D272/D308

24.4300

AUTHOR: Librescu, Liviu

TITLE: Non-linear 'flutter' of thin inhomogeneous cylindrical structures

PERIODICAL: Studii şi cercetări de mecanică aplicată, no. 3, 1962, 681 - 700

TEXT: The problem of non-linear 'flutter' of thin cylindrical panels, consisting of several elastic orthotropic layers (T.E. Hess A. Rocket Soc. Jour. no. 2, 1961) is examined on basis of the monograph of V.V. Bolotin. It is assumed that a stream of liquid of high supersonic velocity flows on one side of the panel, while stationary air is applied to the other side. The equations of the problem are reduced to a nonlinear system in terms of the potential function c and the normal displacement w. An approximate method has to be adopted for the solution of this system. By means of the Galerkin method, a system of non-linear differential equations is obtained. These equations are applied to several particular cases. There are 3 figures and 1 table.

/B

Card 1/1

SUBMITTED: February 24, 1962

LIBRESCU, L.

New formulation of the general problem of thin elastic shells.

p. 511 (Academia Republicii Populare Romine. Institutul de Mecanica Aplicata. Studii Si Cercetari De Mecanica Aplicata. Vol. 8, no. 2, 1957. Bucuresti, Rumania)

Monthly Index of East European Accessions (EEAI) LC. Vol. 7, no. 2, February 1958

LIBRESCU, L.

On the thermoelastic problem of thin shells of an arbitrary form. p. 809.

COMUNICARILE. Bucuresti, Rumania, Vol. 8, no. 8, Aug. 1958

Monthly list of European Accessions (EEAI) LC, Vol. 8, no. 8, Aug. 1959

Uncl.

24.4100

80417

RUM/8-59-1-11/24

AUTHOR: Librescu, Liviu

TITLE: Some Problems of the Theory of a Type of Elastic, Thin, Nonhomogeneous Coverings

PERIODICAL: Studii si Cercetări de Mecanică Aplicată, 1959, Nr 1, pp 187 - 202 (RUM)

ABSTRACT: The author extends the theory of nonhomogeneous coverings composed of an odd number of layers, by the correspondence of thin, isotrope, homogeneous coverings established by the static-geometrical analogy. These layers are arranged symmetrically as related to the medium thickness of the covering surface (geometrical and elastical symmetry). He starts with the hypothesis that each component layer is homogeneous and isotrope, following the physical law of Hooke, and accepts the hypothesis established in [Refs 2 and 3], on the base of which the layers are firmly fit together. He considers the following hypotheses of [Refs 2 and 3] to be valid: a) The hypothesis of nondeformability of the normal element located on the medium surface of the covering; b) the hypothesis of the nullity of the unitary normal stresses located on the equally distant surfaces against the medium surface. Based on these hypotheses, the values of the $\frac{\delta}{R\ min}$ order in

Card 1/13

80417

RUM/8-59-1-11/24

Some Problems of the Theory of a Type of Elastic, Thin, Nonhomogeneous Coverings

ratio of the unity is being neglected. He also assumes that the covering is referred to an orthogonal system of coordinates (α, β), and z is equal to a constant representing a certain surface parallel to the considered medium surface. He indicates with "j" a certain layer out of the considered 2n + 1 layers (n = 1,2,3,...) and the statical, physical and geometrical values characterizing the "j" layer or provided with the "j" index. The unitary system of a "j" layer expressed by the law of Hooke are expressed by:

$$\sigma_{\alpha}^{j}(z) = \frac{E_j}{1-\mu_j^2}\left[(\varepsilon_1 + \mu_j \varepsilon_2) + z(\chi_1 + \mu_j \chi_2)\right],$$

$$\sigma_{\alpha\beta}^{j}(z) = \frac{E_j}{1-\mu_j^2}\left[(\varepsilon_2 + \mu_j \varepsilon_1) + z(\chi_2 + \mu_j \chi_1)\right]$$

$$\tau_{\alpha\beta}^{j}(z) = \frac{E_j}{2(1+\mu_j)}(\omega + 2z\tau) \qquad (1)$$

in which σ_α, σ_β, $\tau_{\alpha\beta}$ are the unitary stresses from the threedimensional medium of the covering: E_j = elasticity module of the material; μ_j = the Poisson coefficient of the material; ε_1, ε_2, ω = tangential deformations

Card 2/13

4

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929820(

80417

RUM/8-59-1-11/24

Some Problems of the Theory of a Type of Elastic, Thin, Nonhomogeneous Coverings

of the medium surface; χ_1, χ_2, τ - bending deformations of the medium surface. The author then deduces the following expressions of stresses and moments:

$$T_\alpha = 2\sum \frac{E_j(\delta_j - \delta_{j-1})}{1-\mu_j^2}\left[\varepsilon_1 + \frac{\sum \frac{\mu_j E_j(\delta_j - \delta_{j-1})}{1-\mu_j^2}}{\sum \frac{E_j(\delta_j - \delta_{j-1})}{1-\mu_j^2}}\varepsilon_2\right]$$

$$T_\beta = 2\sum \frac{E_j(\delta_j - \delta_{j-1})}{1-\mu_j^2}\left[\varepsilon_2 + \frac{\sum \frac{\mu_j E_j(\delta_j - \delta_{j-1})}{1-\mu_j^2}}{\sum \frac{E_j(\delta_j - \delta_{j-1})}{1-\mu_j^2}}\varepsilon_1\right]$$

$$T_{\alpha\beta} = -T_{\beta\alpha} = \sum \frac{E_j(\delta_j - \delta_{j-1})}{1+\mu_j}\,\omega \qquad (3)$$

$$M_\alpha = -\frac{2}{3}\sum \frac{E_j(\delta_j^3 - \delta_{j-1}^3)}{1+\mu_j}\left[\chi_1 + \frac{\sum \frac{\mu_j E_j(\delta_j^3 - \delta_{j-1}^3)}{1-\mu_j^2}}{\sum \frac{E_j(\delta_j^3 - \delta_{j-1}^3)}{1-\mu_j^2}}\chi_2\right]$$

$$M_\beta = -\frac{2}{3}\sum \frac{E_j(\delta_j^3 - \delta_{j-1}^3)}{1-\mu_j^2}\left[\chi_2 + \frac{\sum \frac{\mu_j E_j(\delta_j^3 - \delta_{j-1}^3)}{1-\mu_j^2}}{\sum \frac{E_j(\delta_j^3 - \delta_{j-1}^3)}{1-\mu_j^2}}\right]$$

Card 3/13

80417
RUM/8-59-1-11/24

Some Problems of the Theory of a Type of Elastic, Thin, Nonhomogeneous Coverings

$$M_{\alpha\beta} = - M_{\beta\alpha} = \frac{2}{3} \sum \frac{E_i (\delta_i^3 - \delta_{i-1}^3)}{1 + \mu_i} \tau \qquad (3)$$

Expressing the deformation components of these relations by the power components of the deformation, the author obtains the following physical relations:

$$T_\alpha = 2 \sum \frac{E_i(\delta_i - \delta_{i-1})}{1 - \mu_i^2} \left[\varepsilon^{(1)} + \frac{\sum \frac{\mu_i E_i (\delta_i - \delta_{i-1})}{1 \mu_i^2}}{\sum \frac{E_i (\delta_i - \delta_{i-1})}{1 \mu_i^2}} \varepsilon^{(2)} \right]$$

$$T_\beta = 2 \sum \frac{E_i(\delta_i - \delta_{i-1})}{1 - \mu_i^2} \left[\varepsilon^{(2)} + \frac{\sum \frac{\mu_i E_i (\delta_i - \delta_{i-1})}{1 \mu_i^2}}{\sum \frac{E_i (\delta_i - \delta_{i-1})}{1 - \mu_i^2}} \varepsilon^{(1)} \right]$$

$$T_{\alpha\beta} = 2 \sum \frac{E_i(\delta_i - \delta_{i-1})}{1 - \mu_i^2} \left[\omega^{(1)} + \frac{\sum \frac{\mu_i E_i (\delta_i - \delta_{i-1})}{1 - \mu_i^2}}{\sum \frac{E_i (\delta_i - \delta_{i-1})}{1 - \mu_i^2}} \omega^{(2)} \right]$$

Card 4/13

80447
RUM/8-59-1-11/24

Some Problems of the Theory of a Type of Elastic, Thin, Nonhomogeneous Coverings

$$T_{\beta\alpha} = 2\sum \frac{E_i(\delta_i - \delta_{i-1})}{1-\mu_i^2}\left[\omega^{(2)} + \frac{\sum \frac{\mu_i E_i(\delta_i - \delta_{i-1})}{1-\mu_i^2}}{\sum \frac{E_i(\delta_i - \delta_{i-1})}{1-\mu_i^2}}\omega^{(1)}\right.$$

$$M_\alpha = \frac{2}{3}\sum \frac{E_i(\delta_i^3 - \delta_{i-1}^3)}{1-\mu_i^2}\left[\chi^{(1)} + \frac{\sum \frac{\mu_i E_i(\delta_i^3 - \delta_{i-1}^3)}{1-\mu_i^2}}{\sum \frac{E_i(\delta_i^3 - \delta_{i-1}^3)}{1-\mu_i^2}}\chi^{(2)}\right.$$

Card 5/13

Some Problems of the Theory of a Type of Elastic, Thin, Nonhomogeneous Coverings

$$M_{\beta} = \frac{2}{3}\sum \frac{E_j(\delta_j^3-\delta_{j-1}^3)}{1-\mu_j^2}\left[\varkappa^{(2)} + \frac{\sum \frac{\mu_j E_j(\delta_j^3-\delta_{j-1}^3)}{1-\mu_j^2}}{\sum \frac{E_j(\delta_j^3-\delta_{j-1}^3)}{1-\mu_j^2}}\varkappa^{(1)}\right]$$

$$M_{\alpha\beta} = \frac{2}{3}\sum \frac{E_j(\delta_j^3-\delta_{j-1}^3)}{1-\mu_j^2}\left[\tau^{(1)} + \frac{\sum \frac{\mu_j E_j(\delta_j^3-\delta_{j-1}^3)}{1-\mu_j^2}}{\sum \frac{E_j(\delta_j^3-\delta_{j-1}^3)}{1-\mu_j^2}}\tau^{(2)}\right] \qquad (4)$$

$$M_{\beta\alpha} = \frac{2}{3}\sum \frac{E_j(\delta_j^3-\delta_{j-1}^3)}{1-\mu_j^2}\left[\tau^{(2)} + \frac{\sum \frac{\mu_j E_j(\delta_j^3-\delta_{j-1}^3)}{1-\mu_j^2}}{\sum \frac{E_j(\delta_j^3-\delta_{j-1}^3)}{1-\mu_j^2}}\tau^{(2)}\right]$$

Starting with the relations:

$$T_{\alpha} = F^{*}\left[\varepsilon^{(1)} + \mu^{*}\varepsilon^{(2)}\right]; \quad T_{\beta} = F^{*}\left[\varepsilon^{(2)} + \mu^{*}\varepsilon^{(1)}\right] \qquad (5),$$

and

$$\varkappa^{(1)} = D^{**}\left[M_{\alpha} - \mu^{**}M_{\beta}\right]; \quad \varkappa^{(2)} = D^{**}\left[M_{\beta} - \mu^{**}M_{\alpha}\right], \qquad (6),$$

which are based on the physical relations (4), the author establishes the static-geometrical analogy by the correspondence:

Card 6/13

80417
RUM/8-59-1-11/24

Some Problems of the Theory of a Type of Elastic, Thin, Nonhomogeneous Coverings

$$T_\alpha \longleftrightarrow -\varkappa^{(2)}, \quad M_\beta \longleftrightarrow \varepsilon^{(1)}, \quad M_\alpha \longleftrightarrow \varepsilon^{(2)},$$
$$T_\beta \longleftrightarrow -\varkappa^{(1)}, \quad F^* \longleftrightarrow D^{**}, \quad \mu^* \longleftrightarrow -\mu^{**}. \qquad (I)$$

and:

$$T_{\alpha\beta} \longleftrightarrow \tau, \quad M_{\beta\alpha} \longleftrightarrow -\omega^{(1)}, \quad M_{\alpha\beta} \longleftrightarrow -\omega^{(2)}, \quad T_{\beta\alpha} \longleftrightarrow \gamma^{(1)}, \qquad (II)$$

and deduces the relations which complete these correspondences:

$$Q_\beta \longleftrightarrow \zeta_1, \quad Q_\alpha \longleftrightarrow \zeta_2, \quad a \longleftrightarrow u, \quad b \longleftrightarrow v, \quad c \longleftrightarrow w, \quad \nu \longleftrightarrow \delta, \qquad (III)$$

in which Q_α and Q_α are the cutting forces; ζ_1, ζ_2 = transversal deformations; a, b, c, ν = stress functions [Ref 1]; u, v, w = the components of the displacement vectors; δ = normal component of the elastic rotation. By the correspondence established in (I), (II) and (III), the number of unknown values and of the relations to be examined is reduced to the half. Using the static-geometrical analogy, the author calculates the equations of the theory of nonhomogeneous coverings with a slight curvature under the action of an outer load of the components X', Y', - Z', placed in a nonuniform temperature field T (α, β, z). Following the static-geometrical analogy he reduces the equation of balance:

Card 7/13

80417

RUM/8-59-1-11/24

Some Problems of the Theory of a Type of Elastic, Thin, Nonhomogeneous Coverings

$$\frac{\partial T'_{\alpha\beta}}{\partial \alpha} + \frac{\partial T'_{\alpha\beta}}{\partial \beta} + X' = 0, \quad \frac{\partial T'_{\alpha\beta}}{\partial \alpha} + \frac{\partial T'_{\beta}}{\partial \beta} + Y' = 0,$$

$$\frac{T'_{\alpha}}{R_1} - 2\frac{T'_{\alpha\beta}}{R_{12}} + \frac{T'_{\beta}}{R_2} + \frac{\partial Q'_{\alpha}}{\partial \alpha} + \frac{\partial Q'_{\beta}}{\partial \beta} + Z' = 0. \qquad (11)$$

$$\frac{\partial M'_{\alpha\beta}}{\partial \alpha} - \frac{\partial M'_{\beta}}{\partial \beta} + Q'_{\beta} = 0, \quad \frac{\partial M'_{\alpha}}{\partial \alpha} - \frac{\partial M'_{\alpha\beta}}{\partial \beta} - Q'_{\alpha} = 0.$$

and the equation of compatibility:

$$\frac{\partial \varkappa_*^{(2)}}{\partial \alpha} + \frac{\partial \tau_*^{(1)}}{\partial \beta} = 0, \quad \frac{\partial \tau_*^{(2)}}{\partial \alpha} - \frac{\partial \varkappa_*^{(1)}}{\partial \beta} = 0.$$

$$-\frac{\varkappa_*^{(2)}}{R_1} - \frac{\varkappa_*^{(1)}}{R_2} - 2\frac{\tau_*^{(2)}}{R_{12}} \frac{\partial \varepsilon_2^*}{\partial \alpha} + \frac{\partial \varepsilon_1^*}{\partial \beta} = 0, \qquad (12)$$

Card 8/13

30417
RUM/8-59-1-11/24

$$-\frac{\partial \omega_*^{(2)}}{\partial \alpha} + \frac{\partial \varepsilon_*^{(1)}}{\partial \beta} + \mathcal{C}_1^* = 0, \quad \frac{\partial \varepsilon_*^{(2)}}{\partial \alpha} + \frac{\partial \omega_*^{(2)}}{\partial \beta} + \mathcal{C}_2^* = 0. \qquad (12)$$

For this purpose, based on the ideas in [Refs 5 and 6], he starts with the expressions of the unitary stress given in the case of a nonuniform temperature field T (α , β , z) and accepts the Love-Kirchoff hypothesis (Nr 13). He then deduces the expressions of stresses and moments:

$$\begin{aligned}
T'_\alpha &= T_\alpha - \sum \frac{E_j}{1-\mu_j}\left[\int_{\delta_{j-1}}^{\delta_j} \beta_j T\,dz + \int_{-\delta_j}^{\delta_{j-1}} \beta_j T\,dz\right],\\
T'_\beta &= T_\beta - \sum \frac{E_j}{1-\mu_j}\left[\int_{\delta_{j-1}}^{\delta_j} \beta_j T\,dz + \int_{-\delta_j}^{\delta_{j-1}} \beta_j T\,dz\right],\\
T'_{\alpha\beta} &= T_{\alpha\beta},\\
M'_\alpha &= M_\alpha + \sum \frac{E_j}{1-\mu_j}\left[\int_{\delta_{j-1}}^{\delta_j} \beta_j T z\,dz + \int_{-\delta_j}^{-\delta_{j-1}} \beta_j T z\,dz\right],\\
M'_\beta &= M_\beta + \sum \frac{E_j}{1-\mu_j}\left[\int_{\delta-1}^{\delta_j} \beta_j T z\,dz + \int_{-\delta_j}^{-\delta_{j-1}} \beta_j T z\,dz\right],\\
M'_{\alpha\beta} &= M_{\alpha\beta}.
\end{aligned} \qquad (15)$$

Card 9/13

80417
HUM/8-59-1-11/24

Some Problems of the Theory of a Type of Elastic, Thin, Nonhomogeneous Coverings

The balance equation of slightly curved coverings:

$$\frac{\partial T_\alpha}{\partial \alpha} + \frac{\partial T_{\alpha\beta}}{\partial \beta} + X = 0, \quad \frac{\partial T_{\alpha\beta}}{\partial \alpha} + \frac{\partial T_\beta}{\partial \beta} + Y = 0,$$

$$\frac{T_\alpha}{R_1} - 2\frac{T_{\alpha\beta}}{R_{12}} + \frac{T_\beta}{R_2} + \frac{\partial Q'_\alpha}{\partial \alpha} + \frac{\partial Q'_\beta}{\partial \beta} + Z = 0, \qquad (17)$$

$$\frac{\partial M_{\alpha\beta}}{\partial \alpha} - \frac{\partial M_\beta}{\partial \beta} + Q'_\beta = R, \quad \frac{\partial M_\alpha}{\partial \alpha} - \frac{\partial M_{\alpha\beta}}{\partial \beta} - Q'_\alpha = -P,$$

and the homogeneous equations of compatibility:

$$\frac{\partial x^{(2)}}{\partial \alpha} + \frac{\partial \tau^{(1)}}{\partial \beta} = \Gamma_1, \quad \frac{\partial \tau^{(2)}}{\partial \alpha} - \frac{\partial x^{(1)}}{\partial \beta} = \Gamma_2,$$

$$-\frac{x^{(2)}}{R_1} - \frac{x^{(1)}}{R_2} - 2\frac{\tau^{(2)}}{R_{12}} - \frac{\partial \mathcal{E}_2^*}{\partial \alpha} + \frac{\partial \mathcal{E}_1^*}{\partial \beta} = \Lambda, \qquad (19)$$

$$-\frac{\partial \omega^{(2)}}{\partial \alpha} - \frac{\partial \varepsilon^{(1)}}{\partial \beta} + \mathcal{E}_1^* = \Delta_1, \quad \frac{\partial \varepsilon^{(2)}}{\partial \alpha} + \frac{\partial \omega^{(2)}}{\partial \beta} + \mathcal{E}_2^* = -\Delta_2.$$

Card 10/13

80417

RUM/8-59-1-11/24

Some Problems of the Theory of a Type of Elastic, Thin, Nonhomogeneous Coverings

Since the homogeneous equation of compatibility (19), and the homogeneous equation of balance (17) have the same structure, they can be compiled into a single system. Each equation of the system is a semivariation of the static-geometrical analogy [Ref 7]. Based on the complex stress combinations, the equations of the slightly curved coverings are expressed in a complex form:

$$\frac{\partial \tilde{T}_\alpha}{\partial \alpha} + \frac{\partial \tilde{T}_{\alpha\beta}}{\partial \beta} + \tilde{X} = 0, \quad \frac{\partial \tilde{T}_{\alpha\beta}}{\partial \alpha} + \frac{\partial \tilde{T}_\beta}{\partial \beta} + \tilde{Y} = 0,$$

$$\frac{T_\alpha}{R_1} - 2\frac{T_{\alpha\beta}}{R_{12}} + \frac{T_\beta}{R_2} + \frac{\partial \tilde{Q}_\alpha}{\partial \alpha} + \frac{\partial \tilde{Q}_\beta}{\partial \beta} + \tilde{Z} = 0, \qquad (22)$$

$$\frac{\partial \tilde{M}_{\alpha\beta}}{\partial \alpha} - \frac{\partial \tilde{M}_\beta}{\partial \beta} + Q_\beta = R; \quad \frac{\partial \tilde{M}_\alpha}{\partial \alpha} - \frac{\partial \tilde{M}_{\alpha\beta}}{\partial \beta} - \tilde{Q} = -\tilde{P},*$$

Card 11/13 in which:

80417

RUM/8-59-1-11/24

Some Problems of the Theory of a Type of Elastic, Thin, Nonhomogeneous Coverings

$$\tilde{X} = X + i\zeta\Gamma_1, \quad \tilde{Y} = Y + i\zeta\Gamma_2, \quad \tilde{Z} = Z + i\zeta\Lambda,$$
$$\tilde{R} = R + i\zeta\Delta_1, \quad \tilde{P} = P + i\zeta\Delta_2. \qquad (23)$$

The ten equations of the system (17) and (19) are equal to the complex system of 5 equations (22). Thus one has to determined the factor ζ which appears in a final shape:

$$\zeta = \left(\frac{F^*}{D^{**}}\right)^{1/2} = \sqrt{F^*G^{**}(1 - \mu^{**2})}. \qquad (27)$$

Finally the author determines the effort expressions:

$$W = \frac{1}{\zeta}\,\mathrm{Im}\,C, \quad T_\alpha = \frac{\partial^2 c}{\partial\beta^2} - \int_{\alpha_0}^{\alpha} X\,d\alpha, \quad T_\beta = \frac{\partial^2 c}{\partial\alpha^2} - \int_{\beta_0}^{\beta} Y\,d\beta,$$
$$T_{\alpha\beta} = -\frac{\partial^2 c}{\partial\alpha\,\partial\beta}, \qquad (34)$$

$$M_\alpha = -G^{**}\left(\frac{\partial^2 w}{\partial\beta^2} + \mu^{**}\frac{\partial^2 w}{\partial\alpha^2}\right) + G^{**}\left(\int_{\beta_0}^{\beta}\Gamma_2\,d\beta + \mu^{**}\int_{\alpha_0}^{\alpha}\Gamma_1\,d\alpha,\right.$$

Card 12/13

4

LIBRESCU, L.

Regarding the theory of thin elastic structures, composed of orthotropic layers, disposed symmetrically on the thickness in rapport to the median surface. p.837

STUDII SI CERCETARI DE MECANICA APLICATA. Academia Republicii Populare Romine
Bucuresti, Rumania
Vol. 10, no.3, 1959

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

23659
R/008/60/000/004/010/018
A125/A126

10.9100 also: 1327

AUTHOR: Librescu, Liviu

TITLE: On the theory of thin structures built of elastic layers

PERIODICAL: Studii şi Cercetări de Mecanică Aplicată, no. 4, 1960, 937 - 955

TEXT: The article presents a generalization of the results obtained by the author in (Ref. 1: Zadachi teorii tonkikh uprugikh obolochek, sostavlennykh iz uprugikh izotropnykh sloyev, raspolozhennykh simmetrichno otnositel'no sredinnoy poverkhnosti. Revue de mecanique appliquèe, 4, 2, 1959; Ref. 2: În legătură cu teoria structurilor elastice subţiri construite din straturi ortotrope simetric dispuse faţă de suprafaţa mediană. Studii şi cercetări de mecanică aplicată, X, 3, 1959; and Ref. 3: Cîteva probleme ale teoriei unei clase de învelitori elastice, subţiri, neomogene, Studii şi cercetări de mecanică aplicată, X, 1, 1959). The generalization consists of the establishment of the theory of thin structures obtained by the arbitrary overlaying of m homogeneous, isotropic elastic layers. The employed hypotheses of S. A. Ambartsumyan (Ref. 4: Raschet pologikh tsilindricheskikh obolochek, sobrannykh iz anizotropnykh sloyev.

Card 1/3

23659

R/008/60/000/004/010/018
A125/A126

On the theory of thin structures ....

Izv. Akad. Nauk Armyanskoy SSR, IV, 5, 1951) and E. I. Grigolyuk, (Ref. 5: O prochnosti i ustoychivosti tsilindricheskikh bimetallicheskikh obolochek. Inzh. sbornik, 16, 1953) are reduced to the admittance of a) all layers of the structure are rigidly fixed together to deform as a whole; and b) the Love-Kirchhoff hypothesis remains valid for the structure as a whole. A certain layer out of the m considered layers is notated with j, whereas the plastic physical and geometrical values are provided with the index j, while the forces and moments depend on the tangential and bending distortions. The lower surface of the n-th layer taken from the external limiting surface of the structure is considered to be initial, which is then referred to an orthogonal system of coordinates, generally non-conjugated. The reciprocity principle of Betti (Ref. 9: A. L. Goldenbeyzer, O primenimosti obshchikh teorem uprugosti k tonkim obolochkam. Priklad. Matem. i Mekh. VIII, I, 1944; Ref. 10: Teoriya uprugikh tonkikh obolochekh. Gostekhizdat, Moskva, 1953) becomes applicable. The author then establishes the static-geometrical analogy and applies it to the investigation of the stress state of structures of little curvature, considering the existence of a surface load and a non-uniform temperature field. Starting from the equations of equilibrum and compatibility within the hypotheses of little curvature the author deduces the equations of equilibrum and compatibility reduced to the elastic

Card 2/ 3

23659

On the theory of thin structures R/008/60/000/004/010/018
A125/A126

case. The author finally calculates the state of stresses of cylindrical panels of little curvature radially supported on the contour. There is 1 figure, 1 table and 15 Soviet-bloc references.

SUBMITTED: January 4, 1960

X

Card 3/3

37662
S/124/62/000/005/041/048
D251/D308

10.6200

AUTHOR: Librescu, L.

TITLE: Elastic multilayer shells

PERIODICAL: Referativnyy zhurnal. Mekhanika, no. 5, 1962, 7, abstract 5V41 (Rev. méc. appl. (RPR), 1960, v. 5, no. 5, 695 - 710)

TEXT: A theory is described which deals with the stress component of multilayer shells of arbitrary form, consisting of several elastic isotropic layers and disposed in an arbitrary way with respect to the initial surface of the shell. The shells are considered to be loaded with an arbitrary surface load and to be in the presence of a non-uniform temperature load. The theory proposed is constructed on the hypothesis introduced into the theory of multilayer shells by S.A. Ambartsumyan and E.I. Grigolyuk: 1) The material of isotropic and homogeneous layers in the form of a shell is subject to Hooke's law; the possibility is excluded of one layer creeping with respect to another at the surfaces of contact; 2) For the shell under consideration the Love-Kirchoff hypothesis holds. By conside-

Card 1/3

ring that the homogeneous equations of the equilibrium of shells and the equations of conjunction, and also the relation between the shearing forces and the functions of the shearing forces, and between the deformations and displacements have the same form, the author introduces a statico-geometric analog. The introduction of this analog permits the number of unknown functions to be reduced by two times. The general equations of the non-homogeneous shell under consideration are written in complex form through the introduction of complex forces and moments analogous to that which was first realized by V.V. Novozhilov (Izv. AN SSSR, Otd. tekhn. n., 1946, no. 1, 35-48), for homogeneous and isotropic shells. The problem of determining the stress coefficients of the shells leads to that of determining the complex tensor of stress through whose components, and with the aid of simple operations, the components of the shearing forces and the moments are determined, together with the displacement and deformations of the original surface of the shell. A detailed consideration is given to the theory formulated for such shells by A.A. Gol'denveyzer (Prikl. matem. i mekhan. 1945 v. 9, no. 6, 463-478) and the statico-geometric analog used in the general case which permits the two-fold reduction of the number of

Elastic multilayer shells S/124/62/000/005/041/048
D251/D308

unknowns and also the writing of the equations of the shell in complex form. 20 references. [Abstractor's note: Complete translation]

4

Card 3/3

10.6120
10.9010

23033
R/008/61/000/001/008/011
D237/D301

AUTHOR: Librescu, Liviu

TITLE: The vibrations of circular-cylindrically-shaped thin elastic structures, placed in a supersonic fluid stream

PERIODICAL: Studii şi cercetări de mecanică aplicată, no. 1, 1961, 139 - 156

TEXT: The author studies the problem of the vibrations of circular-cylindrically-shaped thin elastic structures, constructed by arbitrarily superposing m orthotropic layers. This cylindrical structure is considered to be placed in a supersonic, ideal fluid stream. The stream is considered to be potential and isentropic, with an infinite velocity of U, whose vector is directed parallel with the axis of the cylindrical structure. The results obtained by the author represent an extension of the results obtained by V. V. Bolotin (Ref. 1: Kolebaniya i ustoychivost' uprugoy tsilindri-

Card 1/11

23033

R/008/61/000/001/008/011
D237/D301

The vibrations of ...

cheskoy obolochki v potoke szhimayemoy zhidkosti (Vibrations and Stability of a Rigid Cylindrical Shell in a Compressed Liquid Flow) Inzh. sbornik, XV, 5, 1953) with regard to homogeneous and isotropic shells. The author first establishes the equations regarding the elasticity of structures constructed of layers, and then determines the hydrodynamic equations, the case of the transversal vibrations, and finally that of the forces of tangential inertia. The elasticity equations are deduced by considering the structure built of m orthotropic layers, arbitrarily disposed on the thickness and by the Love-Kirchoff hypothesis, and finally considering the lower surface of the n-th layer taken from the external limiting surface of the structure to be the reference surface of the forces and moments. This reference surface is referred to an orthogonal curvilinear surface α, $s = R\theta$, which represents the length of the generator's arc and that of the directing circle, respectively, R being the radius corresponding to the reference surface of the structure. Selected also is the system of cylindrical axes, r,

Card 2/11

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929820(

θ, x, so that the axis x coincides with the cylinder's axis. Based on the hypothesis of small curvature, the author establishes the equilibrium equations:

$$\text{(I)}\quad \frac{\partial T_\alpha}{\partial \alpha} - \frac{\partial T_{\beta\alpha}}{\partial s} + X = 0, \qquad \text{(II)}\quad \frac{\partial T_{\alpha\beta}}{\partial \alpha} + \frac{\partial T_\beta}{\partial s} + Y = 0,$$

$$\text{(III)}\quad \frac{T_\beta}{R} + \frac{\partial Q_\alpha}{\partial \alpha} + \frac{\partial Q_\beta}{\partial s} + Z = 0, \qquad (1) \qquad (1)$$

$$\text{(IV)}\quad Q_\alpha = \frac{\partial M_\alpha}{\partial \alpha} + \frac{\partial M_{\beta\alpha}}{\partial s}, \qquad \text{(V)}\quad Q_\beta = -\frac{\partial M_{\alpha\beta}}{\partial \alpha} + \frac{\partial M_\beta}{\partial s}.$$

$$\text{(VI)}\quad T_{\alpha\beta} + T_{\beta\alpha} = 0.$$

the distortion-displacement geometrical relations:

$$\varepsilon_1 = \frac{\partial u}{\partial \alpha}, \quad \varepsilon_2 = \frac{\partial v}{\partial s} - \frac{w}{R}, \quad \omega = \frac{\partial v}{\partial \alpha} + \frac{\partial u}{\partial s},$$

$$\varkappa_1 = \frac{\partial^2 w}{\partial \alpha^2}, \quad \varkappa_2 = \frac{\partial^2 w}{\partial s^2}, \quad \tau = \frac{\partial^2 w}{\partial \alpha \partial s}. \qquad (2) \qquad (2)$$

Card 3/11

The vibrations of ...

and the physical equations

$$T_\alpha = \overset{1}{F}_\alpha(\varepsilon_1 + \overset{1}{\mu}_\beta \varepsilon_2) + \overset{1}{K}_\alpha(\varkappa_1 + \overset{5}{\mu}_\beta \varkappa_2),$$
$$T_\beta = \overset{1}{F}_\beta(\varepsilon_2 + \overset{1}{\mu}_\alpha \varepsilon_1) + \overset{1}{K}_\beta(\varkappa_2 + \overset{5}{\mu}_\alpha \varkappa_1),$$
$$T_{\alpha\beta} = -T_{\beta\alpha} = \frac{F_\alpha}{2}(1 - \overset{2}{\mu}_\beta)\omega + \overset{2}{K}_\alpha(1 - \overset{6}{\mu}_\beta)\tau, \quad (3)$$
$$M_\alpha = -\overset{1}{G}_\alpha(\varkappa_1 + \overset{3}{\mu}_\beta \varkappa_2) - \overset{1}{K}_\alpha(\varepsilon_1 + \overset{5}{\mu}_\beta \varepsilon_2),$$
$$M_\beta = -\overset{1}{G}_\beta(\varkappa_2 + \overset{3}{\mu}_\alpha \varkappa_1) - \overset{1}{K}_\beta(\varepsilon_2 + \overset{5}{\mu}_\alpha \varepsilon_1),$$
$$M_{\alpha\beta} = -M_{\beta\alpha} = \frac{\overset{2}{K}_\alpha}{2}(1 - \overset{6}{\mu}_\beta)\omega + \overset{2}{G}_\alpha(1 - \overset{4}{\mu}_\beta)\tau.$$

The forces and moments T_α, T_β, $T_{\alpha\beta}$, $T_{\beta\alpha}$, M_α, M_β, $M_{\alpha\beta}$, and $M_{\beta\alpha}$ may be obtained from the power components of the distortion $\varepsilon^{(1)}$, $\varepsilon^{(2)}$, $\omega^{(1)}$, $\omega^{(2)}$, $\varkappa^{(1)}$, $\varkappa^{(2)}$, $\tau^{(1)}$, and $\tau^{(2)}$ by a linear transformation with symmetrical matrix. Eliminating the cutting forces from the first five equations of (1) and ignoring the sixth, the author deduces the equilibrium equations in the displacements given by the system of symmetric matrices:

$$L_{11}u + L_{12}v + L_{13}w + X = 0, \qquad L_{21}u + L_{22}v + L_{23}W + Y = 0$$

$$L_{31}u + L_{32}v + L_{33}w - Z = 0 \qquad (6)$$

in which L_{ik} $(i, k = 1, 2, 3)$ are linear differential operators with constant coefficients expressed by the relations

$$L_{11} = \overset{1}{F}_\alpha \frac{\partial^2}{\partial\alpha^2} + \frac{\overset{2}{F}_\alpha}{2}(1 - \overset{2}{\mu}_\beta)\frac{\partial^2}{\partial s^2}; \quad L_{12} = L_{21} = \left[\frac{\overset{2}{F}_\alpha}{2}(1 - \overset{2}{\mu}_\beta) + \overset{1}{\mu}_\alpha \overset{1}{F}_\beta\right]\frac{\partial^2}{\partial\alpha\,\partial s},$$

$$L_{13} = L_{31} = [\overset{2}{K}_\alpha(1 - \overset{6}{\mu}_\beta) + \overset{1}{K}_\alpha \overset{5}{\mu}_\beta]\frac{\partial^3}{\partial\alpha\,\partial s^2} + \overset{1}{K}_\alpha \frac{\partial^3}{\partial\alpha^3} - \frac{\overset{1}{\mu}_\beta \overset{1}{F}_\alpha}{R}\frac{\partial}{\partial\alpha}, \qquad (7)$$

$$L_{22} = \frac{\overset{2}{F}_\alpha}{2}(1 - \overset{2}{\mu}_\beta)\frac{\partial^2}{\partial\alpha^2} + \overset{1}{F}_\beta \frac{\partial^2}{\partial s^2},$$

Card 5/11

23033
R/008/61/000/001/008/011
D237/D301

The vibrations of ...

$$L_{23} = L_{32} = [\overset{2}{K}_\alpha(1 - \overset{6}{\mu}_\beta) + \overset{1}{K}_\beta \overset{5}{\mu}_\alpha]\frac{\partial^3}{\partial\alpha^2\partial s} + \overset{1}{K}_\beta\frac{\partial^3}{\partial s^3} - \frac{\overset{1}{F}_\beta}{R}\frac{\partial}{\partial s}, \qquad (7)$$

$$L_{33} = \overset{1}{G}_\alpha\frac{\partial^4}{\partial\alpha^4} + 2[\overset{1}{G}_\alpha\overset{3}{\mu}_\beta + \overset{2}{G}_\alpha(1 - \overset{4}{\mu}_\beta)]\frac{\partial^4}{\partial\alpha^2\partial\beta^2} + \overset{1}{G}_\beta\frac{\partial^4}{\delta s^4} - 2\frac{\overset{1}{K}_\beta}{R}\left[\frac{\partial^2}{\partial s^2} + \overset{5}{\mu}_\alpha\frac{\partial^2}{\partial\alpha^2}\right] + \frac{\overset{1}{F}_\beta}{R^2}.$$

Denoting by m the mass of the structure corresponding to the unitary area of the reference surface, and by p_i and p_e the internal and the external pressure, respectively, the components of the vectors of the external forces in the case of the dynamic problem are given by

$$X = -m\frac{\partial^2 u}{\partial t^2}; \quad Y = -m\frac{\partial^2 v}{\partial t^2}; \quad Z = -m\frac{\partial^2 w}{\partial t^2} + p_i - p_e. \qquad (8)$$

Card 6/11

The author then deduces the displacements u, v, w, expressed by the potential function

$$u = R\left[\frac{\overset{2}{F}_\beta}{\overset{1}{F}_\alpha \overset{1}{F}_\beta}\overset{1}{K}_\beta - \frac{2\overset{2}{K}_\alpha}{\overset{1}{F}_\alpha}\frac{1-\overset{6}{\mu}_\beta}{1-\overset{2}{\mu}_\alpha} + \frac{2\overset{1}{K}_\beta}{\overset{1}{F}_\alpha}\frac{\overset{1}{\mu}_\alpha - \overset{5}{\mu}_\alpha}{1-\overset{2}{\mu}_\alpha}\right]\frac{\partial^5\Phi}{\partial\alpha\,\partial s^4} +$$

$$+ R\left[\frac{2}{\overset{1}{F}_\beta}\overset{2}{K}_\alpha\overset{1}{\mu}_\beta\frac{1-\overset{6}{\mu}_\beta}{1-\overset{2}{\mu}_\alpha} + \frac{2\overset{1}{K}_\beta}{\overset{1}{F}_\beta}\frac{\overset{5}{\mu}_\alpha\overset{1}{\mu}_\beta}{1-\overset{2}{\mu}_\alpha} - \frac{2\overset{1}{K}_\alpha}{\overset{1}{F}_\alpha(1-\overset{2}{\mu}_\alpha)}\right]\frac{\partial^5\Phi}{\partial\alpha^3\partial s^2} -$$

$$- R\frac{\overset{2}{F}_\beta}{\overset{1}{F}_\alpha\overset{1}{F}_\beta}\overset{1}{K}_\alpha\frac{\partial^5\Phi}{\partial\alpha^5} - \frac{\overset{2}{F}_\beta}{\overset{1}{F}_\alpha}\frac{\partial^3\Phi}{\partial\alpha\partial s^2} + \frac{\overset{2}{F}_\beta\overset{1}{\mu}_\beta}{\overset{1}{F}_\beta}\frac{\partial^3\Phi}{\partial\alpha^3}, \qquad (12)$$

$$v = R\left[\frac{\overset{2}{F}_\beta}{\overset{1}{F}_\alpha\overset{1}{F}_\beta}\overset{1}{K}_\alpha + \frac{2\overset{1}{K}_\alpha}{\overset{1}{F}_\beta}\frac{\overset{1}{\mu}_\beta - \overset{5}{\mu}_\beta}{1-\overset{2}{\mu}_\alpha} - \frac{2\overset{2}{K}_\alpha}{\overset{1}{F}_\beta}\frac{1-\overset{6}{\mu}_\beta}{1-\overset{2}{\mu}_\alpha}\right]\frac{\partial^5\Phi}{\partial\alpha^4\partial s} -$$

23033
R/008/61/000/001/008/011
D237/D301

The vibrations of ...

$$-R\left[\frac{2\overset{1}{K}_\beta}{\overset{1}{F}_\beta}\frac{1-\overset{1}{\mu}_\beta\overset{5}{\mu}_\alpha}{1-\overset{2}{\mu}_\alpha}-\frac{2\overset{2}{K}_\alpha\overset{1}{\mu}_\alpha}{\overset{1}{F}_\alpha}\frac{1-\overset{6}{\mu}_\beta}{1-\overset{2}{\mu}_\alpha}\right]\frac{\partial^5\Phi}{\partial\alpha^2\partial s^3}-R\frac{\overset{2}{F}_\beta}{\overset{1}{F}_\alpha\overset{1}{F}_\beta}\overset{1}{K}_\beta\frac{\partial^5\Phi}{\partial s^5}+$$

$$+\left[\frac{2(1-\overset{1}{\mu}_\alpha\overset{1}{\mu}_\beta)}{1-\overset{2}{\mu}_\alpha}-\frac{\overset{2}{F}_\beta}{\overset{1}{F}_\beta}\overset{1}{\mu}_\beta\right]\frac{\partial^3\Phi}{\partial\alpha^2\partial s}+\frac{\overset{2}{F}_\beta}{\overset{1}{F}_\alpha}\frac{\partial^3\Phi}{\partial s^3}, \qquad (12)$$

$$w=R\left[\frac{\overset{2}{F}_\beta}{\overset{1}{F}_\beta}\frac{\partial^4\Phi}{\partial\alpha^4}+\frac{\overset{2}{F}_\beta}{\overset{1}{F}_\alpha}\frac{\partial^4\Phi}{\partial s^4}+2\left(\frac{1-\overset{1}{\mu}_\alpha\overset{1}{\mu}_\beta}{1-\overset{2}{\mu}_\alpha}-\frac{\overset{2}{F}_\beta\overset{1}{\mu}_\alpha}{\overset{1}{F}_\alpha}\right)\frac{\partial^4\Phi}{\partial\alpha^2\partial s^2}\right],$$

and the condition equation for the potential:

$$\frac{\partial^8\Phi}{\partial\alpha^8}+a_1\frac{\partial^8\Phi}{\partial\alpha^6\partial s^2}+a_2\frac{\partial^8\Phi}{\partial\alpha^4\partial s^4}+a_3\frac{\partial^8\Phi}{\partial\alpha^2\partial s^6}+a_4\frac{\partial^8\Phi}{\partial s^8}+ \qquad (13)$$

Card 8/11

23033
R/008/61/000/001/008/011
D237/D301

The vibrations of ...

$$+\frac{a_5}{R}\frac{\partial^8\Phi}{\partial\alpha^4\partial s^2}+\frac{a_6}{R}\frac{\partial^8\Phi}{\partial\alpha^2\partial s^4}+\frac{a_7}{R}\frac{\partial^8\Phi}{\partial\alpha^6}+\frac{a_8}{R^2}\frac{\partial^4\Phi}{\partial\alpha^4}=\frac{Z\overset{1}{F}_\beta}{R\overset{2}{F}_\beta\left[\overset{1}{G}_\alpha-\frac{(\overset{1}{K}_\alpha)^2}{\overset{1}{F}_\alpha}\right]}. \quad (31)$$

This equation, states the author, may be applied to structures constructed unsymmetrically from orthotropic layers and to structures of m isotropic layers. The author then deduces the expression of the natural frequency in vacuum:

$$\omega_1^2-\omega^2=\frac{m_2}{m}(\omega-kU)^2. \quad (32)$$

The natural frequencies ω may be graphically obtained as intersecting points of the curves, corresponding to the right hand and left hand sides of the frequency equation (32). The additional mass m is a transcendental function of the frequency ω and the stream's velocity U. In case of U = 0, the natural frequency is expressed

Card 9/11

23033
R/008/61/000/001/008/011
D237/D301

The vibrations of ...

by

$$\omega = \frac{\omega_1}{\sqrt{1+\frac{m_*}{m}}}. \quad (33)$$

but for the velocity

$$U_* = \frac{\omega_1}{k}\sqrt{\frac{m}{m_*}} \quad (34)$$

one obtains $\omega = 0$. For the expression of the w component of the displacement vector (12), the author deduces relation

$$w = \frac{w_0}{\frac{U_*^2}{U^2} - 1}. \quad (37)$$

which shows that when the stream velocity U is close to U_*, the normal displacement w increases considerably. This explains why U_*

Card 10/11

23033
R/008/61/000/001/008/011
D237/D301

The vibrations of ...

is a critical velocity. There are 4 tables and 6 Soviet-bloc references.

SUBMITTED: October 1, 1960

X

Card 11/11

27421

R/008/61/000/004/002/003
D238/D304

10.6300

AUTHORS: Petre, A., Stănescu, C., and Librescu, L.

TITLE: Aeroelastic divergence of box-beam wings, taking into consideration the fastening restraints

PERIODICAL: Studii şi cercetări de mecanică aplicată, no. 4, 1961, 755 - 764

TEXT: The article presents a solution of the problem of aeroelastic divergence in the case of lifting surfaces of a constant cross-section, taking into consideration the spanwise moment and the effect of the fastening restraints. Starting with the hypothesis of A. A. Umanskiy /Abstracter's note: Umanskiy's hypothesis not stated/, according to which the longitudinal motion u(y, s), in case of impeded twisting, is proportional to the ω (s) motion of the free twisting, the authors deduce

$$u(y, s) = \omega(s) \quad \psi(y) \qquad (1)$$

Card 1/7

in which φ (s) is a function which has to be determined, while y and s are variable values along the span, and along the contour of the transversal section, respectively. On the base of this equation, and taking the method of Galerkin into consideration, the authors deduce the fundamental equation of impeded twisting

$$\bar{k}^2 \frac{d^4\varphi}{dy^4} - \frac{d^2\varphi}{dy^2} = - \frac{m_t}{GI_d} + \frac{\bar{k}^2}{GI_c} \frac{d^2 m_t}{dy^2} \quad (8)$$

in which $\bar{k}$ is expressed by: $\bar{k} = \sqrt{\frac{EI_\omega}{\nu GI_d}}$ (9)

ν being the de-levelling coefficient defined by Ebner, GI_d the rigidity to the free twisting, φ the twisting angle, I_ω the inertia moment, and m_t the twisting moment distributed along the span.

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929820(

27421
R/008/61/000/004/002/003
D238/D304

Aeroelastic divergence...

[Abstracter's note: the other symbols of (8) are not defined, while the Galerkin method is not stated]. Denoting the wing chord with c, the distance between the elastic axis and the line of the aerodynamic centers with e, the dynamic pressure with $q = \frac{\rho}{2} V^2$, and the gradient of the lifting curve with $\frac{dC_z}{di}$, the differential equation of the aeroelastic divergence in case of impeded twisting may be expressed by

$$\bar{k}^2 \frac{d^4\varphi}{dy^4} + \left(\frac{\bar{k}^2 qce \frac{dC_z}{di}}{GI_c} - 1\right)\frac{d^2\varphi}{dy^2} - \frac{qce \frac{dC_z}{di}}{GI_d}\varphi = 0 \quad (11)$$

Card 3/7

27421
R/008/61/000/004/002/003
D238/D304

Aeroelastic divergence...

Considering

$$X = \frac{b^2 qce \frac{dC}{di}}{4GI_d} \quad ; \quad k = \frac{4\bar{k}^2}{b^2} \tag{13}$$

to be the zero-dimensional parameters, the equation (11) changes into

$$k\frac{d^4\varphi}{d\zeta^4} + [k(1-\gamma)-1]\frac{d^2\varphi}{d\zeta^2} - X\varphi = 0 \tag{14}$$

The solution of this equation is

$$\varphi = C_1 \sin\alpha\zeta + C_2 \cos\alpha\zeta + C_3 \operatorname{sh}\beta\zeta + C_4 \operatorname{ch}\beta\zeta \tag{15}$$

Card 4/7

27421
R/008/61/000/004/002/003
D238/D304

Aeroelastic divergence...

in which α and β are expressed by:

$$\alpha = \sqrt{\frac{k(1-\nu)X - 1 + \sqrt{k^2(1-\nu)^2X^2 + 2k(1+\nu)X + 1}}{2k}}, \quad (16)$$

$$\beta = \sqrt{\frac{-k(1-\nu)X + 1 + \sqrt{k^2(1-\nu)^2X^2 + 2k(1+\nu)X + 1}}{2k}}.$$

The integrating constants C_1, C_2, C_3, and C_4 amy be determined on the basis of the following two conditions: 1) The conditions:

$$\varphi = 0 \quad \text{and} \quad u = 0 \quad (18)$$

Card 5/7

have to be satisfied at the fastening section of the wing; and 2) the conditions:

$$M_t = 0 \quad \text{and} \quad \delta y = 0 \tag{23}$$

have to be satisfied at the free end of the wing, M_t being the twisting moment. The authors finally deduce the fundamental equation of the aeroelastic divergence of single-box-beam wings of constant cross-section, taking into consideration the fastening restraints:

$$\frac{2k\nu X}{\operatorname{ch}\sqrt{\dfrac{1-k(1-\nu)X+\sqrt{k^2(1-\nu)^2X^2+2k(1+\nu)X+1}}{2k}}} - \tag{28}$$

$$-\nu\sqrt{kX}\,[k(1-\nu)X-1]\times$$

$$\times\sin\sqrt{\frac{k(1-\nu)X-1+\sqrt{k^2(1-\nu)^2X^2+2k(1+\nu)X+1}}{2k}}\times$$

4

27421
R/008/61/000/004/002/003
D238/D304

Aeroelastic divergence...

$$\times \operatorname{th} \sqrt{\frac{1 - k(1-\nu)X + \sqrt{k^2(1-\nu)^2X^2 + 2k(1+\nu)X + 1}}{2k}} +$$
$$+ [k^2(1-\nu)^2X^2 + 2kX + 1)] \times \quad (28)$$
$$\times \cos \sqrt{\frac{k(1-\nu)X - 1 + \sqrt{k^2(1-\nu)^2X^2 + 2k(1+\nu)X + 1}}{2k}} = 0,$$

This equation was solved by an I.F.A.-2 electronic computer at the Institutul de fizica al Academiei RPR (Institute of Physics of the Rumanian Academy). There are 2 figures, 1 table and 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: R. Bisplinghoff, H. Ashley, R. Halfman, "Aeroelasticity", Cambridge, 1955.

SUBMITTED April 18, 1961

Card 7/7

LIBRESCU, Liviu

Elastodynamic problems of thin nonhomogeneous structures. Studii cerc mec apl 12 no.4:861-876 '61.

(Elastic plates and shells)

34914
R/008/62/000/001/005/007
D272/D304

10.7100

AUTHOR: Librescu, L.

TITLE: The dynamic problem of shallow thin viscoelastic shells

PERIODICAL: Mecanică aplicată, no. 1, 1962, 137-149

TEXT: The authors takes into account the tangential inertial forces in addition to the transversal, as well as the nonlinear terms due to the presence of large deformations. It is assumed that the Love-Kirchhoff hypothesis is valied, the material is homogeneous, isotropic and viscoeleastic and the shell has constant thickness h. First the equilibrium equations, the geometrical relations deformation-displacement, the compatibility equations, and the physical equations were derived. Applying the principle of P. M. Naghdi, the author derives a system of 3 equations in terms of the potential function c, the normal displacement w and the stress resultant $T_{\alpha,\beta}$. It is then shown that the initial system of equations can be further simplified into two simpler systems, one of which is obtained

Card 1/3

R/008/62/000/001/005/007
D272/D304

G. Zartarian, Piston theory - a new aerodynamic tool for the aero-elastician. Journn. Aeronaut. Sci., 23, 6, (1956).

SUBMITTED: October 14, 1961

X

Card 3/3

41526

R/008/62/013/004/002/002
D409/D301

24.4200
11.2313

AUTHOR: Librescu, L.

TITLE: Vibrations and aero-elastic stability of thin non-homogeneous cylindrical shells in a compressible fluid flow

PERIODICAL: Mecanică aplicată, v. 13, no. 4, 1962, 911-933

TEXT: Vibrations and stability of circular cylindrical shells are considered, formed of s elastic-orthotropic layers. The resolving equations of the problem are derived on the following assumptions: a) The layers are rigidly connected so that the shell is deformed as an entity; b) the Love-Kirchhoff hypothesis is valid; c) the curvature of the shell is small. In order to reduce the problem to a system of equations in the normal displacement w and the stress function c, the method given in the references is adopted. Thereby the tangential stresses T are expressed in terms of the function c and the functions F_1 and F_2 (which are particular integrals of an equation obtained from the equilibrium- and compatibility

Card 1/4

equations). The inertia forces, as well as transverse and tangential damping are taken into account. The resolving system of equations is obtained. The vibrations of the shells are considered in a compressible, potential, isentropic flow. The velocity vector is parallel to the shell axis. The system of equations is simplified. In the case of an infinite cylinder, the solution of the simplified system is

$$c = c_* e^{i(\omega t - k\alpha)} \cos n\theta, \qquad w = w_* e^{i(\omega t - k\alpha)} \cos n\theta, \qquad (30)$$

where c_* and w_* are constants. Non-dimensional parameters are introduced. Thereupon, the frequency (characteristic) equation is obtained which can be used for studying the stability of the shells under consideration. Two cases of loss of stability are examined: static (divergent) instability and dynamic instability (flutter). In the first case one obtains for the critical divergence-velocity

$$M_{div} = \frac{V_1}{c_\infty}\sqrt{\frac{m}{m_*}}, \qquad (33)$$

R/008/62/013/004/002/002
D409/D301

Vibrations and aero-elastic ...

where V_1 is the velocity of elastic waves for natural vibrations of the shell in vacuo. This case was studied for Mach numbers $M_1 < 1$. The critical flutter velocity is determined, in the case of high Mach numbers, by means of the generalized Routh-Hurwitz criterion. Thereby one obtains

$$M_{*}|_{\delta_1 = 0} = 1 + \frac{m g_3}{\rho_0 c_\infty} \frac{\tilde{\omega}_1}{\tilde{k}}, \qquad (43)$$

where $\tilde{k} = \pi R/\lambda$. Equation 43 shows that the minimum flutter-velocity corresponds to the minimum of $V_1/c_\infty = \tilde{\omega}_1/\tilde{k}$. Additional formulas are derived which permit calculating easily the critical flutter velocity. Equation 43 shows that the value of $M_{*}|_{\delta_1 = 0}$ depends also on the magnitude of the damping factor g_3. Hence the use of materials with a high damping factor may lead to a substantial increase in the critical flutter-velocity. This is evidence of the importance

Card 3/4

Vibrations and aero-elastic ... R/008/62/013/004/002/002
D409/D301

of multi-layer structures in the design of rockets and space vehicles. The obtained formulas are also valid for structures consisting of isotropic layers, arbitrarily disposed in thickness, for structures made of orthotropic layers which are symmetrical in thickness, as well as for orthotropic homogeneous structures. There are 2 figures and 2 tables.

SUBMITTED: April 25, 1962

Card 4/4