"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHIDOV, V.V., dotsent

Benign neoplasms and cysts of the lungs and mediastinum. Med. zhur.Uzb. no.6:26-34 Je '58. (MIRA 13:6)

1. Iz kafedry obshchey khirurgii lechebnogo fakul'teta (zav. - prof. Kh.G. Gafurov) Tashkentskogo gosudarstvennogo meditsinskogo instituta.

(LUNG--TUMORS) (CYSTS)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHIDOV, V.V., kand.med.nauk (Tashkent, ul. Karla Marksa, d.59) RYABUKHIN, I.A., kand.med.nauk

Reconstructive operations on the extrahepatic bile ducts in cicatrical stenosis. Vest.khir. 83 no.10:48-54 O '59. (MIRA 13:2)

1. Iz kafedry obshchey khirurgii (zaveduyushchiy - prof. Kh.G. Gafurov) Tashkentskogo meditsinskogo instituta.
(BILE DUCTS diseases)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHIDOV, V.V., dotsent

Histogenesis and structure of the pleural adhesions; experimental and clinical studies. Med. zhur. Uzb. no.11:40-44 N '61. (MIRA 15:2)

1. Iz kafedry obshchey khirurgii Moskovskogo stomatologicheskogo instituta (zav. - prof. B.E.Linberg) i kafedry obshchey khirurgii (zav. - prof. Kh.G.Gafurov) lechebnogo fakul'teta Tashkentskogo gosudarstvennogo meditsinskogo instituta.
(PLEURA—DISEASES)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHIDOV, V.V., dotsent

Treatment of spontaneous pneumothorax. Med. zhur. Uzb. no.12:25-27 D '61. (MIRA 15:2)

1. Iz kafedry obshchey khirurgii Moskovskogo stomatologicheskogo instituta (zav. - prof. B.E.Linberg) i kafedry obshchey khirurgii lechebnogo fakul'teta (zav. - prof. Kh.G.Gafurov [deceased]) Tashkentskogo gosudarstvennogo meditsinskogo instituta.
(PNEUMOTHORAX)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHIDOV, V.V., dotsent

Histogenesis and structure of pleural adhesions experimental and clinical studies. Report No.2. Med. zhur. Uzb. no.1: 54-59 Ja '62. (MIRA 15:3)

1. Iz kafedry obshchey khirurgii Moskovskogo stomatologicheskogo instituta (zav. - prof. B.E. Linberg) i kafedry obshchey khirurgii lechebnogo (fakul'teta Tashkentskogo gosudarstvennogo meditsinskogo instituta (zav. - prof. Kh.G. Gufurov [deceased]).
(PLEURA--DISEASES)
(ADHESIONS (ANATOMY))

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHIDOV, V.V., dotsent

Histotopographical structure of the blood vessels in inflammatory adhesions of the pleura. Med.zhur.Uzb. no.3:49-54 Mr '62. (MIRA 15:12)

1. Iz kafedry obshchey khirurgii (zav. - prof. B.E.Linberg) Moskovskogo stomatologicheskogo instituta i kafedry obshchey khirurgii lechebnogo fakul'teta (zav. - prof. Kh.G.Gafurov [deceased]) Tashkentskogo gosudarstvennogo meditsinskogo instituta.
(PLEURA) (ADHESIONS (ANATOMY)--BLOOD SUPPLY)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHIDOV, V.V.

Vascularization of pleural adhesions. Eksper. khir. i anest. 7 no.4:16-20 Jl-Ag '62. (MIRA 17:5)

1. Iz kafedry obshchey khirurgii (zav. - zasluzhennyy deyatel' nauki laureat Leninskoy premii B.E.Linberg) Moskovskogo stomatologicheskogo instituta i iz kafedry obshchey khirurgii lechebnogo fakul'teta (zav. - prof. Kh.G.Gafurov) Tashkentskogo meditsinskogo instituta.

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

GASPARYAN, Ivan Gavrilovich, prof.; VAKHIDOV, V.V., dots., spets. red.; AVAKIMOVA, L.A., red.izd-va; SUKHANOV, P.P., tekhn. red.

[Tuberculomas of the lungs] Tuberkulomy legkikh. Tashkent, Medgiz UzSSR, 1963. 76 p. (MIRA 17:3)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHIDOV, V.V., dotsent; AZIZOV, N.A.; IMAMOV, I.Kh.

Late results of lung resection in tuberculosis. Probl. tub. 42 no.8:28-32 '64. (MIRA 18:12)

1. Kafedra obshchey khirurgii (ispolnyayushchiy obyazannosti zaveduyushchego - dotsent V.V.Vakhidov) lechebnogo fakul'teta Tashkentskogo meditsinskogo instituta i khirurgicheskoye otdeleniye protivotuberkuleznogo dispansera No.2 (glavnyy vrach N.A.Azizov), Tashkent.

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

ARSHAVSKIY, I.A.; VAKHIDOVA, O.T.; YENIKEYEVA, A.I.; [illegible]

Analysis of the characteristics of the tonus of the vagal innervation center of the heart in lower monkeys (Macaca). Biul. eksp. biol. i med. 57 no.4.12-16 Ap '64. (MIRA 18:3)

1. Laboratoriya vozrastnoy fiziologii i patologii (zav. - prof. I.A. Arshavskiy) Instituta normal'noy i patologicheskoy fiziologii (dir. - deystvitel'nyy chlen AMN SSSR V.V. Parin) AMN SSSR, Moskva. Submitted April 28, 1963.

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHIDOVA, O.T.

Analysis of the characteristics of energy losses in dogs of various ages. Biul. eksp. biol. i med. 59 no.2:32-36 F '65. (MIRA 18:7)

1. Laboratoriya vozrastnoy fiziologii i patologii (zav. - prof. I.A. Arshavskiy) Instituta normal'noy i patologicheskoy fiziologii (dir. - deystvitel'nyy chlen AMN SSSR prof. V.V. Parin) AMN SSSR, Moskva.

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

YUNUSOV, A.Yu.; MAKHMUDOV, E.S.; VAKHIDOVA, R.T.

Effect of a predominantly protein and carbohydrate diet on salt and water metabolism at high temperatures. Izv.AN Uz. SSR.Ser.med. no.2:35-44 '58. (MIRA 12:5)

1. Institut krayevoy meditsiny AN UzSSR.
(BLOOD--ANALYSIS AND CHEMISTRY) (SALT IN THE BODY) (DIET)
(HEAT--PHYSIOLOGICAL EFFECT)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

YUNUSOV, A.Yu., akademik; VAKHIDOVA, R.T.

Effect of stimulation of interoceptors of the digestive tract on the saline composition of the blood. Izv. AN Uz.SSR. Ser.med. no.4:3-8 '59. (MIRA 12:12)

1. AN UzSSR (for Yunusov). 2. Institut krayevoy meditsiny AN UzSSR.
(DIGESTIVE ORGANS) (BLOOD--ANALYSIS AND CHEMISTRY) (REFLEXES)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHIDOVA, R. T.

Cand Biol Sci - (diss) "Effect of irritation of the mechano-receptors of the gastro-intestinal tract on the water-salt metabolism under conditions of high temperature." Tashkent, 1961. 19 pp; (Academy of Sciences Uzbek SSR, Inst of Kray Experimental Medicine); 160 copies; price not given; (KL, 6-61 sup, 206)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHIDOVA, R.T.

Influence of stimulation of the mechanoreceptors in the gastrointestinal tract on some blood indexes at high temperature. Med. zhur. Uzb. no.4:31-34 Ap '61. (MIRA 14:5)

1. Iz laboratorii fiziologii (zav. - prof. A.Yu.Yunusov) Instituta kravevoy eksperimental'noy meditsiny AN UzSSR.

(DIGESTIVE ORGANS) (RECEPTORS (NEUROLOGY))
(BLOOD) (HEAT—PHYSIOLOGICAL EFFECT)
(SOLAR RADIATION—PHYSIOLOGICAL EFFECT)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHILOV, A. Z.

VAKHILOV, A. Z. — "Topographico-Analytic Interrelations of the Lumbar Triangles and the Costo-Diaphragmatic Sinuses in Connection with Access to the Subdiaphragmatic Spaces." Samarkand State Med Inst imeni Academician I. P. Pavlov, Samarkand, 1955. (Dissertation For the Degree of Candidate in Medical Sciences).

SO: Knizhnaya letopis', No. 37, 3 September 1955

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

Yu. N. Verdgin. (Avtom. Svarka, 1957, (3), 78–78). [In Russian]. Electric arc welding in CO_2 of heat resisting steel 15XMA can be ...

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

Vakhitov, G.G.

124-1957-10-11790

Translation from: Referativnyy zhurnal, Mekhanika, 1957, Nr 10, p 86 (USSR)

AUTHORS: Vakhitov, G. G., Govorova, G. L.

TITLE: Some Radial Problems of the Displacement of Petroleum by Water From a Non-uniformly Permeable Layer (Nekotoryye radial'nyye zadachi vytesneniya nefti vodoy iz neodnorodnogo po pronitsayemosti plasta)

PERIODICAL: Tr. Vses. neftegaz. n.-i. in-ta, 1956, Nr 8, pp 250-261

ABSTRACT: The problem of the radial displacement of petroleum by water in a layer of uniform thickness containing two annular zones of different permeability is examined. The difference in the viscosity of water and oil is taken into account as well as the decreased phase permeability relative to water in the displacement region, which is regarded as approximately constant. The fluids and the soil stratum are regarded as incompressible and the seepage as laminar. Also investigated is the case of n annular concentric zones of different permeability. An example demonstrates the effect of non-homogeneity on the time of contraction of the petroliferous contour toward an annular tunnel.

V. L. Danilov

Card 1/1

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

SOV/124-58-4-4329

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 4, p 91 (USSR)

AUTHOR: Vakhitov, G. G.

TITLE: Solution of Problems of Underground Hydrodynamics by Means of the Method of Finite Differences (Resheniye zadach podzemnoy gidrodinamiki metodom konechnykh raznostey)

PERIODICAL: Tr. Vses. neftegaz. n.-i. in-t, 1957, Nr 10, pp 53-87

ABSTRACT: The article considers application of the method of finite differences for the solution of problems pertaining to the seepage of liquids into fully or partly penetrating shallow wells within a layer having nonuniform physical parameters, when the outline of the influence zone is arbitrary. The zone of seepage D is approximated by a flow-net region lying either partly or wholly within the zone D. The boundary conditions along the influence-zone contour are transferred to the border of the flow-net region by interpolation. The wells are considered as points and are located in the nodes of the flow net. Methods are developed for determination of the pressure and velocity fields in a nonuniform layer for the producing wells and the injection wells. A correction coefficient is introduced for

Card 1/2

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

SOV/124-58-4-4329

Solution of Problems of Underground Hydrodynamics (cont.)

determination of the yield of the wells in order to account for the effective well diameters. The problem of the selection of an optimum spacing of the flow net is analyzed. The accuracy of the results is illustrated with a large number of examples suitable for theoretical solution. Bibliography: 5 references.

P. F. Fil'chakov

1. Wells--Water supply 2. Water--Motion 3. Hydrology 4. Mathematics

Card 2/2

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

YERONIN, V.A.; MAL'TSEV, M.V.; VAKHITOV, G.G.; SULTANOV, S.A.

Introducing new machinery and methods in the exploitation of Tatar oil fields. Neft. Khoz. 35 no.10:24-31 O '57. (MIRA 11:1)
(Tatar A.S.S.R.--Petroleum engineering)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

Sov/93-58-7-7/17

AUTHOR: Vakhitov, G.G.; Yeremin, V.A.; Mal'tsev, M.V.; Cholovskiy, I.P.

TITLE: Present State and Future Development of the Romashkino Oilfield in the Tatar ASSR (Tekushcheye sostoyaniye i zadachi dal'neyshey razrabotki Romashkinskogo mestorozhdeniya Tatarskoy ASSR)

PERIODICAL: Neftyanoye khozyaystvo, 1958, Nr 7, pp. 31-37 (USSR)

ABSTRACT: The Romashkino oilfield of the Tatar ASSR was discovered in July 1949. At this field the oil of commercial value is in the oil-bearing sands of the D_{III}, D_{II}, D_I, and D_0 (the Mikhaylovskiy) Devonian formations, as well as in the oil-bearing sands of the carbonaceous formation of lower carbon. The D_I formation is the most important and it has been arbitrarily subdivided into five layers: a, b, c, d, and e. The d and e layers have better porosity and permeability, and greater oil capacity. Fig. 1 presents the geological profiel of the Romashkino oilfield, which is being developed according to a VNII scheme. This scheme provides for the maintenance of reservoir pressure by means of water injection and this makes it possible to artificially separate the oilfield into 23 reservoirs and to exploit the five layers of the D_I formation jointly. Currently only seven of the 23 reservoirs are being commercially exploited. These are the Minnibayevskaya, Abdrakhmanovo, Pavlovskaya, Vostochno-Suleyevskaya, Zelenogorskaya, Yuzhno-Romashkinskaya, and the Al'met'yev oil reservoirs presented in Fig. 2. The Al'met'yev, Aznakayevo, and Bugul'ma oilfield administrations are in charge of the seven oil reservoirs. Table 1 presents data on

Card 1/2

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well spacing at the oilfield. The high operating pressure on the injection lines has made it possible to increase the volume of water injection (Ref.1). Shifts in the oil-bearing contours were determined by a 1957 TatNII study using isobar maps (Ref.2). The oil yield was increased by fracturing the formation (Ref.3). By April 1958 about 127 wells were being exploited either by EPN or SKN-5 pumps. The authors make seven suggestions for the improvement of the Romashkino oilfield exploitation. There are 2 figures, 1 table, and 3 Soviet references.

Card 2/2 1. Petroleum--USSR

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, G.G.; SULTANOV, S.A.

Results of the development of the Romashkino oil field. Geol. nefti i gaza 5 no. 5:12-18 My '61. (MIRA 14:4)

1. Tatarskiy nauchno-issledovatel'skiy neftyanoy institut.
(Romashkino region—Oil fields—Production methods)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, G.G.; SULTANOV, S.A.; ONOPRIYENKO, V.P.; KLYAROVSKIY, G.V.

Additional sectionalization of certain areas of the Romashkino field. Neft. khoz. 40 no.10:28-33 O '62. (MIRA 16:7)

(Romashkino region--Petroleum production)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, Gadel' Galyautdinovich; LATUKHINA, Ye.I., ved. red.; STAROSTINA, L.D., tekhn. red.

[Effective means for solving the production problems in nonuniform oil-and water-bearing layers by the finite difference method] Effektivnye sposoby resheniia zadach razrabotki neodnorodnykh neftevodonosnykh plastov metodom konechnykh raznostei. Moskva, Gostoptekhizdat, 1963. 215 p. (MIRA 16:11)
(Petroleum engineering)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

CHEMODANOV, V.S.; OSHITKO, V.M.; SULTANOV, S.A.; VAKHITOV, G.G.;
POLUYAN, I.G.

Conversion of reserves and the determination of the recovery factor of a flooded section of reservoir D_I in the Bavly field. Neftepròm. delo no.1:13-15'63 (MIRA 17:7)

1. Tatarskiy neftyanoy nauchno-issledovatel'skiy institut, g. Bugul'ma i Neftepromyslovoye upravleniye "Bavlyneft'".

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

BEGISHEV, F.A.; VAKHITOV, G.G.; SULTANOV, S.A.; CHOLOVSKIY, I.P.

Controlling the development of horizon D_1 of the Romashkino oil field. Geol. nefti i gaza 7 no.10:22-26 O '63. (MIRA 17:10)

1. Tatarskiy neftyanoy nauchno-issledovatel'skiy institut, g. Bugul'ma.

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

L 47152-66 EWT(d) IJP(c)

ACC NR: AR6000720 SOURCE CODE: UR/0124/65/000/009/B122/B122

40
B

AUTHORS: Vakhitov, G. G.; Alishayev, M. G.

TITLE: Investigation of difference schemes for nonlinear equations in unsteady filtration

SOURCE: Ref. zh. Mekhanika, Abs. 9B807

REF SOURCE: Tr. Tatarsk. neft. n.-i. in-t, vyp. 6, 1964, 195-211

TOPIC TAGS: difference equation, nonlinear equation, filtration, FLOW RATE, PRESSURE

ABSTRACT: Difference schemes are investigated for parabolic type nonlinear equations describing the unsteady seepage of liquid in a bed whose permeability and piezoconductivity depend on the pressure. It is shown that the nonlinear equation under consideration leads to a linear equation for the case when a constant pressure and a constant flow rate are maintained on the contour, if only the permeability of the bed depends on the pressure and not the piezoconductivity. The investigated equation is replaced by simpler nonlinear finite difference schemes. Applying the principle of "freezing" of coefficients and nonlinearities, the authors have obtained a practical, satisfactory criterion of stability in the explicit finite difference schemes. The applied implicit schemes are always stable. To consider stability and convergence problems under stricter formulation, the properties of the solutions of the applied finite difference scheme are considered. Bibliography of 11 citations. G. R. Gurevich [Translation of abstract]

SUB CODE: 20

Card 1/1 egf

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

L 05679-67 EWT(d) IJP(c) SOURCE CODE: UR/0044/66/000/003/B106/B106

ACC NR: AR6023242

23
B

AUTHOR: Alishayev, M. G.; Vakhitov, G. G.

REF SOURCE: Tr. Tatarsk. neft. n.-i. in-t, vyp. 8, 1965, 336-344

TITLE: On the spectrum and stability conditions of several difference schemes

SOURCE: Ref. zh. Matematika, Abs. 3B557

TOPIC TAGS: difference equation, stability condition, partial differential equation

TRANSLATION: The method of separation of variables is used to investigate certain properties of the totality of eigenvalues of difference equations (in particular sufficient conditions for stability are adduced) which approximate the heat equation with variable coefficients

$$\frac{\partial u}{\partial t}=\sigma(x)\frac{\partial^2 u}{\partial x^2}$$

and the simplest boundary and initial conditions.

SUB CODE: 12/ SUBM DATE: none

UDC: 518:517.944/.947

Card 1/1

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, M.B.

Stress analysis of a raked wing of monolythic design. Izv. vys. ucheb. zav. no.1:61-68 '58. (MIRA 11:3)

1. Kafedra stroitel'noy mekhaniki samoleta Kazanskogo aviatsionnogo instituta. (Airplanes--Wings)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

83793
S/124/60/000/008/011/011
A005/A001

1.9600

Translation from: Referativnyy zhurnal, Mekhanika, 1960, No. 8, pp. 154-155, # 10867

AUTHOR: Vakhitov, M. B.

TITLE: The Calculation of the Monolithic Wing Strength With Allowance for Variability of the Load in the Deformation Process

PERIODICAL: Tr. Kazansk. aviats. in-ta, 1958, Vol. 38, pp. 135-159

TEXT: The author presents an approximate procedure of the statical strength calculation of a monolithic swept-back wing, which takes into account the variability of the aerodynamic load in consequence of the deformation of the wing in flight. It is assumed that these deformations do not affect the aerodynamic characteristics of the wing and are reflected only in the magnitude of the angle of incidence. The wing is considered as a thin tapered plate reinforced by stiffening ribs parallel to the oblique coordinate axes. The deflection function $w(\xi, \eta)$ is expanded into a series:

$$w(\xi, \eta) = \varphi_0(\eta) + \varphi_1(\eta)\xi + \varphi_2(\eta)\xi^2 + \dots$$

Card 1/2

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

83793

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A005/A001

The Calculation of the Monolithic Wing Strength With Allowance for the Variability of the Load in the Deformation Process

from which only a finite number of terms is retained. The author expresses the variation of the elastic potential plate energy through the coefficients $\varphi(\eta)$ of the series, equates this variation to the performance of the external forces in the possible displacements, with allowance for the components which arise owing to the wing deformation, and obtains for the unknown functions $\varphi(\eta)$ a system of linear differential equations and boundary conditions in a number sufficient for the complete determination of $\varphi(\eta)$. The detailed solution is presented for the case, when one restricts to expansion of the first step only, and certain possibilities of simplifications are considered.

N. A. Rostovtsev

Translator's note: This is the full translation of the original Russian abstract.

Card 2/2

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

SOV/123-59-15-61175

Translation from: Referativnyy zhurnal. Mashinostroyeniye, 1959, Nr 15, p 319 (USSR)

AUTHOR: Vakhitov, M.B.

TITLE: Functions of Monolithic Wings

PERIODICAL: Tr. Kazansk. aviats. in-ta, 1958, Vol 43, pp 3 - 16

ABSTRACT: For the calculation of arrow-like wings with a thick covering which are reinforced by longitudinal framing along the generatrices and by ribs, plates are taken as calculation models. The functions of the plate-wing, representing deflection at a given point produced by a single force applied to another point, are determined. An expression for the deflection functions of the plate is chosen, which is expanded into a series on the coordinate along the stream-line chord. Expressions for the variations of the internal energy of the plate and the work of external forces are correlated. The equalizing of these expressions after integration results in an equality from which the equation for determining the coefficient of the deflection function is obtained. From this equation, on the other hand, both the boundary conditions and the conditions of conjugation in the cross sections, to which concentrated loads are applied, are obtained. Because of the com-

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SOV/123-59-15-61175

Functions of Monolithic Wings

plexity of the equation for deriving the functions which serve as coefficients of the series of deflection function, the solution is limited to two terms of the series, representing the deflection of the wing axis relative to this axis (the axis is chosen conditionally). It is shown that the obtained equations permit to determine the functions affecting the wing separately for the conditional bending and twisting unit loads obtained by transposing the applied loads onto the conditional axis. The order of determination of the functions of the bending and twisting effect is given. The deformation of the shape of the cross-section of the wing can be taken into account by the third term of the expansion of the deflection function, but this would lead to complex formulae. It is mentioned that the solution of the obtained equations for the constant cross-section can be obtained with the aid of electro-integrators, but for the wings with variable cross-sections with the aid of electronic digital computers.

K.I.L.

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

SOV/147-59-2-6/20

AUTHOR: Vakhitov, M.B.

TITLE: Determination of the Modes and Frequencies of Bending-Torsional Oscillations of a Helicopter Blade Using Matrices (Opredeleniye form i chastot izgibno-krutil'nykh kolebaniy lopasti vertoleta s pomoshch'yu matrits)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Aviatsionnaya tekhnika, 1959, Nr 2, pp 39-48 (USSR)

ABSTRACT: Only the bending in the flapping plane (i.e. the plane perpendicular to the plane of rotation) is considered. Bending in the plane of rotation following the recommendations of Ref 5 is not included. To evaluate the dynamic strength of a helicopter blade it is necessary to know its modes and frequencies of free oscillations. As shown in Fig 1, a blade is essentially a rod, hinged at one end; the modes and frequencies of a deformable blade (but which does not rotate in the plane of flapping) are usually obtained from the differential equation for the transverse oscillations of beams (Eq 1) by introducing suitable boundary conditions, in conjunction

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Determination of the Modes and Frequencies of Bending-Torsional Oscillations of a Helicopter Blade Using Matrices

with the method of successive approximations, similar to the procedure used for calculation of the airscrews (Ref 3). In this method, at each successive step, it is necessary to consider the orthogonality of the given (obtained) tone with all the preceding tones, due to which a great volume of work is involved. If this method is extended to include the simultaneous bending and torsional oscillations, the solution becomes even more difficult (because there are two simultaneous differential equations) and the volume of calculation increases still further. However, if the matrix method is adopted instead (see Ref 4) the labour needed to evaluate higher overtones decreases firstly, because there is no necessity to analyse the orthogonality of the modes and secondly because the order of the dynamic matrix decreases with the order of the mode. In addition, the effort to obtain the solution is the same whether the mass is distributed or concentrated at a number of points. Finally, the matrix method has the advantage that it

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Determination of the Modes and Frequencies of Bending-Torsional Oscillations of a Helicopter Blade Using Matrices

is suitable for electronic digital computors, the programming being the same for all possible cases. The matrix method has not been used previously because, in order to form a dynamic matrix, it is necessary to know the influence coefficients for the blade (i.e. deformations due to unit loads) and these are indeterminate since the geometry of the blade is variable. In this paper the author makes use of the influence coefficients of a cantilever beam (with one end rigidly fixed) in order to develop the equations for free oscillations of the blade in matrix form. The beam is further divided into a number (n) of small segments each of a length Δx_i (Fig 1) and the segments are then replaced by concentrated loads at the centre of mass of the segments. Assuming now that the tangent (og in Fig 2) to the deformed neutral axis of the blade at the hinge makes only a small angle β with the original form of this axis (straight line ox), deflections f_i of any

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Determination of the Modes and Frequencies of Bending-Torsional Oscillations of a Helicopter Blade Using Matrices

point of the blade are given by Eq (2) and from the approximations of Eq (3), Eq (4) is obtained, from which eventually Eq (5) follows where $\mathcal{Y}$ and X are the columns consisting of 2n elements. Introducing next the influence coefficients Δ_{ik} for bending and δ_{ik} for torsion (these represent respectively deflections and angles of rotation of the cross-sections at $x = x_i$ due to unit transverse load and unit torsional moment applied at the sections $x = x_k$), and forming the matrices for them, Eq (6) is obtained; whence by Eq (7) we get Eq (8). Then by Eq (8) and (5), we obtain Eq (9). To eliminate $\widetilde{\beta}$ from this equation the equilibrium of the blade is considered (moment of all inertia forces with respect to the hinge must be equal zero), then Eq (10) may be derived, which together with Eq (9) leads to Eq (11). Separating variables and using relations (3) and (4) we get Eq (12) (where ν is the circular frequency) and with its help, Eq (5), (8) and (10) transform into Eq (13) to (15), while Eq (11) leads to Eq (16). Thus the well known result that the

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Determination of the Modes and Frequencies of Bending-Torsional Oscillations of a Helicopter Blade Using Matrices

blade has a zero mode of oscillation with zero circular frequency ($\nu_0 = 0$) and $\varphi_0 = X$, corresponding to the rotation of the blade as a rigid body about the axis of the hinge (ГШ axis in Fig 1) is exhibited. It is then shown that the modes of oscillations as given by the roots of Eq (16) possess the property of orthogonality, this is done through Eq (18) to (23). Transforming Eq (16) so as to exclude the zero mode of oscillation (the non-zero modes of oscillation must satisfy Eq (25)), Eq (26) is obtained which is again transformed to Eq (27). Thus the problem of finding the modes and frequencies of oscillation reduces to that of finding from Eq (27) some natural numbers λ_i (with the largest value of the modulus) and the corresponding natural vectors φ_i, which may be done using the method of successive approximations. A simplification of the problem is obtained, if the centres of gravity of the cross-sections coincide with the elastic axis of the beam,

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Determination of the Modes and Frequencies of Bending-Torsional Oscillations of a Helicopter Blade Using Matrices

further oscillations are not coupled; Eq (29) gives the bending and Eq (30) torsional oscillations, respectively. In Table 1 and Fig 3 a comparison is made between the results obtained by the above method (Eq 29) and from the known solutions of the differential equation (Eq 1) for a blade of a constant profile (cross-section). The fundamental (1st) and the 2nd mode only are considered. The frequencies so obtained show good agreement. In conclusion it is stated that the method can be extended to the case of coupled oscillations by taking into account bending of the blade in the plane of its rotation. There are 3 figures, 1 table and 5 references, 4 of which are Soviet and 1 English.

ASSOCIATION: Kazanskiy aviatsionnyy institut, Kafedra stroitel'noy mekhaniki samoleta (Kazan' Institute of Aeronautics, Chair of ~~Theory of~~ Aircraft ~~Structures~~) Construction Mechanics

SUBMITTED: January 6, 1959

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S/147/59/000/04/008/020
E191/E481

24.4100
10.6000

AUTHOR: Vakhitov, M.B.

TITLE: Static Analysis of a Helicopter Blade for Flexure in the Flapping Plane

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Aviatsionnaya tekhnika, 1959, Nr 4, pp 70-78 (USSR)

ABSTRACT: Russian strength requirements are based on the "static" flexure of rotor blades presumably because dynamic flexure analysis has not yet yielded good agreement with tests. The basic equation of flexure is adopted from Flax (Ref 6). Successive approximations have a slow convergence. The Morris method is mentioned in which algebraic equations in bending moments and deflections at sections which are boundaries of blade portions are solved. The complicated coefficients of this system are computed by means of Berry functions. The method proposed by the author is better suited for work on electronic digital computers because it does not require the introduction of Berry functions into the computer memory. Moreover, concentrated axial and transverse forces can be introduced without alteration

Card 1/4

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Static Analysis of a Helicopter Blade for Flexure in the Flapping Plane

of the method. The blade is divided into a number of portions of equal length. The distributed axial load is replaced by concentrated axial forces at the computing sections which divide each two neighbouring portions. In each section the moment of the internal elastic forces is equated to that of the external forces. The second derivative of the deflection is replaced by a second order finite difference. The friction torque of the flapping hinge is introduced as one of the boundary conditions. A matrix equation is derived which represents the system of equilibrium equations for all the computing sections. From this, a final matrix equation follows which expresses the deflections. The computation consists of the multiplication, addition and inversion of matrices. Two of the matrices consist of whole numbers which are introduced into the constants store in the computer. The computer memory requires the introduction of flexural stiffnesses, axial loads and transverse loads.

Card 2/4

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Static Analysis of a Helicopter Blade for Flexure in the Flapping Plane

Examples of two different blades (one weightless with concentrated tip mass and the other with uniformly distributed mass) are given and compared with the Morris solution and with the exact solution (for the first blade only). The accuracy of the proposed method is satisfactory with 10 sections. The computation of the real bending moments is obtained from another matrix equation and basically signifies differentiating of the deflection from its values at the computing sections. In computers with 9 significant figures the loss of accuracy is acceptable. The formulae can be generalized for unequal blade portions. The matrix formulae for the deflections can be used for blades with built-in roots. One of the matrices of constants changes. The method can be extended to the analysis of flexure in the presence of an axial force of a beam on two supports. There are 7 figures and 6 references, 5 of which are Soviet and 1 English.

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Static Analysis of a Helicopter Blade for Flexure in the Flapping Plane

ASSOCIATION: Kafedra stroitel'noy mekhaniki samoleta Kazanskiy aviatsionnyy institut (Chair of Aircraft Construction Mechanics, Kazan Aviation Institute)

SUBMITTED: June 13, 1959

Card 4/4

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, M.B.

Calculation of actual forms and frequencies of vibrations of a monolythic airfoil. Izv. vys. ucheb. zav.; av.tekh. 2 no.1: 16-27 '59. (MIRA 12:3)

1. Kazanskiy aviatsionnyy institut, Kafedra stroitel'noy mekhaniki samoleta. (Airfoils--Vibration)

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, M.B.

Strength analysis of a flexible monolithic wing. Izv.vys. ucheb.zav.; av.tekh. 2 no.3:24-32 '59. (MIRA 12:12)

1. Kazanskiy aviatsionnyy institut. Kafedra stroitel'noy mekhaniki samoletov.

(Airplanes--Wings)

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

SOV/124-59-8-9358

Translation from: Referativnyy zhurnal, Mekhanika, 1959, Nr 8, p 142 (USSR)

AUTHOR: Vakhitov, M.B.
[redacted]

TITLE: The Influence of the Elasticity of the Ribs on the Stresses in a Shell

PERIODICAL: Tr. Kazansk. aviats. in-ta, 1959, Vol 33 - 34, pp 201 - 217

ABSTRACT: The effect of shape distortion of a cross section on the stresses in backswept wings is studied, which have ribs perpendicular to the wing axis and those parallel to the flow. The shell of the wing is presented schematically in the form of a four-girder prismatic box. It is assumed that the ribs fill up the internal space of the box continuously. The backswept wing case is presumed to be consisting of two sections separated by the root rib: the elastic triangle and the non-backswept part. The solution is carried out for the non-backswept part, for which the elastic triangle determines the boundary conditions in the root cross section. This solution is reduced to determining the axial displacements of the spar girders from the system of differential

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The Influence of the Elasticity of the Ribs on the Stresses in a Shell

equations:

$$r \frac{d^4 u_1}{dz^4} - \frac{d^2 u_1}{dz^2} + a (u_1 - u_2) = d_1$$

$$- r \frac{d^4 u_1}{dz^4} - \frac{d^2 u_2}{dz^2} - a (u_1 - u_2) = d_2,$$

where u_1 und u_2 are the axial deformations of the girders of the first and second spars; r, a are constants dependent on the dimensions of the cross section and the characteristics of the material; d is a quantity taking into account the external load. This system has the same form for both the backswept wings having the ribs perpendicular to the wing axis and having the ribs parallel to the flow, and differs merely by the expressions for the coefficients r, a, and d. The general solution of the system is obtained, which contains the solutions for the non-backswept shell as special cases. The results of calculations are presented in the form of graphs of the rib elasticity effect on: 1) the distribution of the axial stresses over the girders of the

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The Influence of the Elasticity of the Ribs on the Stresses in a Shell

rectangular box under the load of a force concentrated at the end; 2) the distribution of the normal forces in the girders of the backswept box with "perpendicular" ribs and with ribs parallel to the flow; 3) the distribution of the tangential stresses in the backswept case. The author shows that the effect of the rib elasticity on the distribution of the axial forces in the fixing is unessential for the backswept box with ribs parallel to the flow. When the ribs are arranged perpendicularly to the axis of the backswept wing, the calculation neglecting the rib elasticity can yield errors. The author shows that a sufficiently satisfactory approximate solution can be obtained, if the elasticity of one front rib is taken into account.

I.L. Kats

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VAKHITOV, M.B.

Lateral bending of cantilever plates. Trudy KAI 46:5-13 '59.
(MIRA 14:2)

(Elastic plates and shells)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

MATVEYEV, G.A.; YEVGRAFOVA, L.N., otv.za vypusk; KURSHEV, N.V., prof.otv.red.; VAKHITOV, M.B., kand.tekhn.nauk, dotsent, red.; GALIULLIN, A.S., doktor, tekhn.nauk, red.; MITRYAYEV, M.I., kand.tekhn.nauk, dotsent, red.; RADTSIG, Yu.A., doktor tekhn.nauk, prof., red.; FEDOROV, A.K., kand.tekhn.nauk, dotsent, red.

[A method for generating tooth surfaces of hyperbolical gears] Odin iz sposobov obrazovaniia poverkhnostei zub'ev giperboloidnykh koles. Kazan' 1960. 23 p. (Kazan. Aviatsionnyi institut. Trudy, no.60). (MIRA 15:3)

(Gearing, Bevel)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

88622
S/147/60/000/004/014/016
E031/E235

10.9110

AUTHOR: Vakhitov, M. B.

TITLE: On the Numerical Solution of the Equation of Transverse Bending for a Slab Wing

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Aviatsionnaya tekhnika, 1960, No. 4, pp. 132-141

TEXT: The problem is that of solving the equation $(t_1\varphi_1'')' + t_3\varphi_1' = F$ (1) for the boundary conditions $\varphi_1(0)=\varphi_1'=0$, $t_1(\ell)\varphi_1''(\ell)+t_4(\ell)\varphi_1'(\ell)=0$, (2), where φ_1 is the angle of wing twist at a section defined by the co-ordinate η, and ℓ is the semi-span. The method of solution is based on the replacement of the differential equation by an integral equation, and representing the integrals in the form of a finite sum, the equations being described in matrix form. It is assumed that the range of integration is split into equal intervals. The usual quadrature formulae of the Newton-Cotes type determine the value of the integral in terms of the values of the integrand at points within the interval of integration. In contrast, the method of this

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On the Numerical Solution of the Equation of Transverse Bending for a Slab Wing

paper represents the integrand in any segment of the range of integration by a polynomial of odd degree 2p+1 which agrees with the integrand at the ends of the segment and at p points to the left and right outside the segment. The integrals over the segments of the range can be expressed in matrix form as $\Delta A = LY$, where Y is a column vector of function values and L is a square integrating matrix. It is to be noted that this method leads to some loss of accuracy at the ends of the range of integration since the same degree polynomial cannot be used. Some examples of L for different values of p are quoted. Five special cases are derived. Taking ζ as the variable of integration, the first two cases are the integration of $y(\zeta)$ from x to ℓ and from 0 to x respectively. In the third case $r(\zeta)y(\zeta)$ is integrated from x to ℓ, in the fourth case the limits are the same and the integrand is $[r(\zeta) - r(x)]\, y(\zeta)$ and in the fifth case the limits are the same and the integrand is $s(\zeta)[y(\zeta) - y(x)]$. It is now possible to return to the original differential equation, which is integrated

Card 2/3

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On the Numerical Solution of the Equation of Transverse Bending for a Slab Wing

from η to ℓ. The integrals occurring are replaced by the matrix representations derived in the preceding section. We now have φ' represented as a matrix product which can conveniently be evaluated on a digital computer. A simplification is obtained in the case of a triangular wing. A singularity in one of the matrix elements which arises in this case is eliminated by using L'Hospital's rule. Results are quoted for an example in which three slab wings are compared (two are triangular and the third is swept with parallel leading and trailing edges). In conclusion it is stated that the advantages of the method described over the usual finite difference technique is due to the smoothing effect of integration. There are 5 figures and 6 references: 4 Soviet and 2 non-Soviet.

ASSOCIATION: Kazanskiy aviatsionnyy institut, Kafedra stroitel'noy mekhaniki
(Kazan' Aviation Institute, Department of Structural Mechanics)

SUBMITTED: February 15, 1960

Card 3/3

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, M.B.

Using matrices in calculating natural vibrations of the rotating blade of a helicopter rotor. Izv. vys. ucheb. zav.; av. tekh. 3 no. 2:31-41 '60. (MIRA 14:5)

1. Kazanskiy aviatsionyy institut, kafedra stroitel'noy mekhaniki samoleta.

(Rotors (Helicopters)—Vibration)

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10.7000

24526
S/147/61/000/002/005/015
E031/E113

AUTHOR: Vakhitov, M.B.

TITLE: Calculation of the strength of a slab wing with non-parallel spanwise ribs

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Aviatsionnaya tekhnika, 1961, No.2, pp. 47-58

TEXT: This paper was presented at the scientific conference of Schools of Higher Education on problems of strength of aircraft structures, held at the Moskovskiy aviatsionnyy institut (Moscow Aviation Institute) in May 1959.
The wing has a thick upper and lower skin capable of taking normal and tangential stresses and it is strengthened by spanwise and chordwise ribs, the latter being parallel to the plane of attachment of the wing. It is assumed that the elements which can be displaced by the intersecting forces are uniformly distributed over the span and chord of the wing. The wing is taken to be an anisotropic cantilever plate for which the problem of transverse bending can be solved using the method of the present author (Ref.1: present journal, 1958, No.1). Consider then a slab wing with a

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Calculation of the strength of a S/147/61/000/002/005/015
E031/E113

transverse load $p(\xi, \eta)$ over its surface and a load on the free edge. Then the bending of the wing may be assumed to have the form:

$$w(\eta, \xi) = \sum^{m} \varphi_k(\eta) \xi^k \quad (1)$$

The unknown function $\varphi_k(\eta)$ is determined from the principle of possible displacements which, with earlier published results of the author (Ref.1) leads to a system of differential equations. In many cases sufficiently good agreement with experimental results is obtained if $m = 1$ in Eq.(1). The equation for φ_1 is independent of φ_0 and can be solved numerically by the method described earlier (Ref.3: same journal, 1960, No.4) by the present author. Substituting this solution in the equation for φ_0, the latter function can be determined. In order to determine the mode and frequency of free oscillations, distortion of the profile may have to be taken into account. Then a reasonable approximation is obtained by taking $m = 2$ in Eq.(1). The coefficients of the differential equations in this case may be simplified by assuming a particular planform for the wing. The above approach is not satisfactory if at any section there are concentrated forces, or if

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Calculation of the strength of a S/147/61/000/002/005/015
E031/E113

either the transverse loading or the cross section have discontinuities. Then it is necessary to consider the wing as made up of several sections, in each of which the above method can be applied. Thus the case of a wing which continues through the fuselage can be considered, bearing in mind conditions of symmetry about the centre line of the aircraft. The same differential equations as before have to be solved, but the boundary conditions are different. It turns out that there are two more boundary conditions than equations, but they are satisfied identically in any case. The theory is applied to the case of a triangular wing with a sweep angle of 45°, and different directions of the span-wise ribs. The character of the stress distribution in the plane of attachment of the wing in the case where the skin does not have normal stresses corresponds qualitatively with the results of H. Schuerch (Ref.6: Aeronautical Engineering Review, No.11, 1952). The case of wings passing through the fuselage is also described. As the length of the wing inside the fuselage increases, the stress concentration in the plane of attachment diminishes, as is to be expected. Acknowledgment is expressed to the student of the Kazan' Aviation Institute V.M. Mustafin for assistance.

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Calculation of the strength of a ... E031/E113

There are 9 figures and 6 references: 1 English and 5 Soviet.
The English language reference reads as follows:
Ref.6: H.U. Schuerch. Aeronautical Engineering Review, No. 11, 1952.

ASSOCIATION: Kafedra stroitel'nov mekhaniki, Kazanskiy aviatsionnyy institut
(Department of Structural Mechanics, Kazan' Aviation Institute)

SUBMITTED: May 21, 1960

Card 4/4

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

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E200/E435

Investigation of stress ...

The author refers to his previous work on torsionless wing bending (Ref.1 and 2: Aviatsionnaya tekhnika, no.1, 1958 and no.2, 1961). There are 10 figures.

ASSOCIATION: Kazanskiy aviatsionnyy institut Kafedra stroitel'noy mekhaniki samoletov (Kazan' Aviation Institute. Department of Structural Mechanics of Aircraft)

SUBMITTED: February 15, 1961

Card 2/2

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

39779

S/147/62/000/002/007/020
E031/E435

10.6300

AUTHOR: Vakhitov, M.B.

TITLE: The construction of an influence matrix for a slab wing and its application to the calculation of free oscillations

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Aviatsionnaya tekhnika, no.2, 1962, 48-55

TEXT: The determination of influence coefficients is normally carried out by repeatedly solving a complex system of differential equations and is therefore only to be recommended for wings of special form. If finite difference methods are applied to the differential relations of the plate theory, the expressions become extremely complicated and if accuracy is not to suffer the number of nodes must be very large and this may lead to instability in the solution. A new method of constructing influence matrices, depending on integrating matrices is proposed. The influence matrix is found according to the approximate bending theory of a slab wing (IVUZ "Aviatsionnaya tekhnika", no.2, 1961), according to which the mean deflection of the wing is sought in the form

Card 1/3

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E031/E435

The construction of an influence ...

$$w(\eta,\xi) = \sum_{k=0}^{m} \varphi_k(\eta)\,\xi^k \qquad (1)$$

where $\varphi_k(\eta)$ are suitably defined functions. The φ_k are determined from the equation

$$\Phi_{k_0} - \Phi'_{k_1} + \Phi''_{k_2} = S_k \quad (k = 0, 1, \ldots, m) \qquad (2)$$

with the boundary conditions

$$\varphi_k(0) = \varphi'_k(0) = 0 \qquad (3)$$

The wing is divided into $n + 1$ spanwise sections of width h. The influence matrix is found by integrating each equation of the system (2) from η to ℓ (ℓ is the span) and applying the method of collocation. Determination of the lowest frequencies and the corresponding modes of free oscillations reduces to the determination of the eigenvalues and eigenvectors of the matrix $U = \Phi I$, where Φ is the influence matrix and

Card 2/3

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The construction of an influence ... S/147/62/000/002/007/020 E031/E435

I is a symmetrical matrix of diagonal submatrices I_q whose elements are the bending moments of inertia for the various sections of the wing. Comparison of the results with experiment showed that for m = 2 the deformation of a transverse section for a plate of small span is given with sufficient accuracy. There are 2 figures and 2 tables.

ASSOCIATION: Kazanskiy aviatsionnyy institut Kafedra stroitel'noy mekhaniki samoleta (Kazan' Aviation Institute, Department of the Constructional Mechanics of Aircraft)

SUBMITTED: July 7, 1961

Card 3/3

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

ACCESSION NR: AP4009642 S/0147/63/000/004/0037/0054

AUTHOR: Vakhitov, M. B.

TITLE: Calculation of the free joint bending-twisting vibrations of a rotating helicopter blade

SOURCE: IVUZ. Aviatsionnaya tekhnika, no. 4, 1963, 37-54

TOPIC TAGS: helicopter blade vibration, bending vibration, twisting vibration, vibration calculation, helicopter, helicopter blade

ABSTRACT: The author calls attention to a previous work (R. L. Bisplingkhoff and others. Aerouprugost'. IL, 1958) in which a matrix method was developed for the calculation of the free bending vibrations of a blade, based on the substitution of a weightless beam with concentrated masses for the blade. In the present paper, as a further refinement of that method, the author has considered the real (continuous) distribution of the mass along the length of the blade, as well as the joint bending-twisting vibrations set up by the setting of the stroke regulator and the failure of the center of strength of the section to coincide with its center of gravity. The finite strength of the control line is also taken into consideration. The joint vibration equations are derived on the basis of the following

Card 1/3

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ACCESSION NR: AP4009642

suppositions: 1) the blade has no geometric twisting; 2) the flexural center in each section lies on the main central axis of inertia; 3) the flexural axis is straight, being, in fact, a continuation of the axis of the axial hinge-joint; 4) the horizontal hinge-joint lies on the axis of rotation of the blade. The author has reduced the determination of the frequencies and forms of the lower tones of the free joint and separate vibrations to the computation of several largest eigennumbers and eigenvectors of matrices. The methods to be used to determine these values are well developed in linear algebra. It is pointed out that the most convenient and effective, from the point of view of the application of electronic computers, is the method of sequential approximations (R. Frezer and others. Teoriya matrits. IL, 1950). Separately considered in the article are the integro-differential equations for the joint vibrations, the matrix equation for separate flexural vibrations, the matrix equation for separate twisting vibrations, the matrix equation for joint bending-twisting vibrations and, finally, a discussion of the finite strength of the control system. "In conclusion, the author considers it his pleasant duty to express his gratitude to engineer M. S. Safariyev and to junior scientific staff worker L. F. Shatrukov, both of whom took part in carrying out the approximate computations for this article." Orig. art. has: 5 tables, 17 figures and 22 formulas.

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

ACCESSION NR: AP4009642

ASSOCIATION: none

SUBMITTED: 06Feb63 DATE ACQ: 12Feb64 ENCL: 00

SUB CODE: PR NO REF SOV: 005 OTHER: 003

Card 3/3

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

S/0147/64/000/001/0175/0180

ACCESSION NR: AP4033055

AUTHOR: Vakhitov, M. B.

TITLE: The derivation of equations for a plane problem on the theory of elasticity in oblique-angle coordinates

SOURCE: IVUZ. Aviatsionnaya tekhnika, no. 1, 1964, 175-180

TOPIC TAGS: elasticity, elasticity theory, tensor analysis, elastic deformation, elastic stress

ABSTRACT: The present paper deals with the derivation, by means of tensor analysis, of a complete system of equations for a plane problem of the elasticity theory in oblique-angle coordinates, and also of formulas for the conversion of stress and deformation components. Equations of the classic theory of elasticity (that is, with small deformations) are considered. The general tensor equations given by I. N. Sneddon and D. S. Berri (Klassicheskaya teoriya uprugosti. Fizmatgiz, 1961) and by J. W. Mar (Theory of Shell Structures, Cambridge, MIT, 1962) are used. In a concluding section, a transition is made from tensor nomenclature to physical components and the nomenclature current in the applied theory of elasticity. The article is in 7 parts. The first deals with fundamental ratios, the second with displacement components, the third with strain tensor com-

Card 1/2

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ACCESSION NR: AP4033055

ponents, the fourth with stress tensor components, the fifth with Hooke's law, the sixth with Kirchhoff ratios, and the seventh with the conversion of the nomenclature discussed above. Orig. art. has: 1 figure and 19 formulas.

ASSOCIATION: none

SUBMITTED: 06Feb63 DATE ACQ: 11May64 ENCL: 00

SUB CODE: AS,GP NO REF SOV: 003 OTHER: 002

Card 2/2

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

L 11293-67 EWT(d)/EWT(m)/EWP(k)/EWP(W)/EWT(V) ...

ACC NR: AP6030251 SOURCE CODE: UR/0147/66/000/003/0050/0061

AUTHOR: Vakhitov, M. B.

ORG: none

TITLE: Integrating matrices - a tool for numerical solutions of differential equations of structural mechanics

SOURCE: IVUZ. Aviatsionnaya tekhnika, no. 3, 1966, 50-61

TOPIC TAGS: mathematic matrix, differential equation, solid mechanical property

ABSTRACT: The paper is a continuation of a previous work by the author (Aviatsionnaya tekhnika, 4, 1964) which in turn is a development and generalization of the method by A. F. Smirnov (Stability and vibrations of constructions, Transzheldorizdat, 1958). It deals with a new method of numerical solution of differential equations which, in contrast to the numerical differentiation (the method of finite differences), consists of finite numerical integrations of the given function subdivided into a number of sections. In each section the function is approximated by a parabola of a suitable order and then the numerical values of the sectional integrals are tabulated with the help of special integrating matrices. As a result, the discrete value of the function to be determined is obtained in a columnar form, and the solution is obtained from a matrix equation using a computer. The construction of the integrating matrices of

UDC: 539.4

Card 1/2

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L 11293-67

ACC NR: AP6030251

various forms is demonstrated. The method is illustrated by the solution of an equation for buckling and transversal bending. Orig. art. has: 26 equations and 7 figures.

SUB CODE: 12/ 20/ 13 SUBM DATE: 04Dec65/ ORIG REF: 003

Card 2/2 jb

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, M. Kh.: Master Med Sci (diss) -- "Some data on the infection rate of workers in the oil industry of the Tatar ASSR for 1954-1957". Kazan', 1958. 17 pp (Kazan' State Med Inst), 200 copies (KL, No 7, 1959, 128)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, M.Kh., kand.med.nauk (Kazan'); TARNOPOL'SKIY, Ya.I., kand.
med.nauk (Kazan')

"Organization of the work of the dispensary in an urban hospital" by S.IA. Freidlin. Reviewed by M.Kh. Vakhitov, IA. I. Tarnopol'skii. Kaz. med. zhur. no. 2:105-106 Mr-Ap '61. (MIRA 14:4)
(HOSPITALS—OUTPATIENT SERVICES)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, M.Kh.; ispolnyayushchiy obyazannosti dotsent

Life span of the urban population of the Tatar A.S.S.R. in the period from 1958 to 1959. Kaz. med. zhur. no.1:76-78 Ja-F'63. (MIRA 16:8)

1. Kafedra organizatsii zdravookhraneniya s istoriyey meditsiny (zav. - prof. T.D.Epshteyn) Kazanskogo meditsinskogo instituta.

(TATAR A.S.S.R.—LONGEVITY)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, M.Kh.

Some data on the longevity of the population in the Tatar A. S. S. R. according to census materials of 1939 and 1959. Nauch. trudy Kaz. gos. med. inst. 14:15-16 '64. (MIRA 18:9:)

1. Kafedra organizatsii zdravookhraneniya s istoriyey meditsiny (zav. - prof. T.D.Epshteyn) Kazanskogo meditsinskogo instituta.

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, N.G.

Effect of a surrounding liquid on the velocity of flexural wave propagation along an elastic strip of finite width. Akust.zhur. 10 no.4:407-411 '64. (MIRA 18:2)

1. Akusticheskiy institut, Moskva.

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

AUTHOR: Vakhitov, N. [illegible]

TITLE [illegible]

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

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Card 2/2

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

L 1380-66 EWT(1)/EWA(h)

ACCESSION NR: AP5022433 UR/0109/65/010/009/1676/1683
621.372.4:535.312

12
9
B

AUTHOR: Vakhitov, N. G.

TITLE: Open resonators with variable-reflection-factor mirrors

SOURCE: Radiotekhnika i elektronika, v. 10, no. 9, 1965, 1676-1683

TOPIC TAGS: resonator, open resonator

ABSTRACT: G. D. Boyd, J. P. Gordon (BSTJ, 1961, 40, 2, 489) and others investigated natural oscillations in open resonators formed by uniform (perfectly reflecting) mirrors operating in a homogeneous medium. The present article presents a theoretical analysis of the same problem, but with the mirrors' local reflection factor varying along the mirror according to the Gauss law. First, a two-dimensional problem of natural oscillations between unbounded parallel planes having variable impedance is considered. Second, the open concave-mirror variable-reflection resonators are examined by a method which substitutes a parabolic equation for the Helmholz wave equation. Formulas for the complex natural frequencies and field distributions are developed. It is pointed out that the natural-frequency spectrum in such variable-reflection resonators is rarefied to a higher degree than that in the case of perfect-reflection resonators. "The author wishes to thank

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L 1380-66

ACCESSION NR: AP5022433

3

L. A. Vaynshteyn for his direction of the work, V. P. Bykov and L. P. Lisovskiy for discussing the results." Orig. art. has: 3 figures and 45 formulas. [02]

ASSOCIATION: none

SUBMITTED: 25May64 ENCL: 00 SUB CODE: EC

NO REF SOV: 004 OTHER: 003 ATD PRESS: 4099

Card 2/2

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

ACC NR: AP7008125 SOURCE CODE: UR/0057/67/037/002/0242/0253

AUTHOR: Vakhitov, N. G.

ORG: none

TITLE: Electromagnetic oscillations of an open resonator consisting of plane mirrors with a dielectric prism mounted between them

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 37, no.2, 1967, 242-253

TOPIC TAGS: laser r and d, laser resonator, open resonator, prism, dielectric material

ABSTRACT: The author discusses the normal modes of an open resonator consisting of plane mirrors between which is mounted a rectangular dielectric prism that does not completely fill the intervening space. The problem is treated in two dimensions, it being assumed that all the fields are independent of one rectangular Cartesian co-ordinate and that the mirrors and the dielectric prism extend to infinity in the direction of the corresponding coordinate axis. The calculations are performed in the geometric optics approximation with the aid of Helmholtz' equation and the boundary conditions at the mirrors and the faces of the dielectric prism. Approximate formulas are derived for the frequencies of the normal modes, and the field distributions within the dielectric prism and in the gaps between the prism and the mirrors are calculated. It is shown that the diffraction losses and the ratio of the field

Card 1/2 UDC: none

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

ACC NR: AP7008125

strength in the dielectric to that in the gaps depend not only on the transverse index of the mode, but also on the longitudinal index. This feature of the system is of practical significance, for it makes it possible to effect dilution of the eigenfrequency spectrum with respect to both the transverse and the longitudinal indices. As regards dilution of the spectrum with respect to the longitudinal index, the system behaves approximately as a pair of coupled resonators, one of which is constituted by the dielectric prism and the other, by the gaps between the dielectric and the mirrors. The author thanks L.A. Vaynshteyn for his guidance of the work. Orig. art. has: 65 formulas and 4 figures. [WA-14] [15]

SUB CODE: 20 SUBM DATE: 27Aug65 ORIG. REF: 005

Card 2/2

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, Ya.Sh.

Measuring the effective porosity of sound-absorbing materials. Trudy LIKI no.3:52-57 '55. (MLRA 9:8)

1. Kafedra akustiki. (Acoustical materials)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, Ya.Sh.

Structural coefficient of a homogeneous and isotropic porous sound-absorbing material. Trudy LIKI no.4:45-47 '56. (MLRA 10:5)

1. Kafedra akustiki. (Acoustical materials)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, Ya.Sh.

Application limits of the Helmholtz formula for the acoustical resistance of cylindrical channels. Trudy LIKI no.4:48-50 '56.

1. Kafedra akustiki. (Sound--Measurement)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV YA SH.

46-2-3/23

AUTHOR: Vakhitov, Ya.Sh., Man'kovskiy, V.S.

TITLE: The form of directional pattern of microphones for stereophonic sound transmission. (O forme kharakteristik napravlennosti mikrofonov dlya stereofonicheskoy zvukoperedachi)

PERIODICAL: "Akusticheskiy Zhurnal" (Journal of Acoustics), 1957, Vol.3, No.2, pp. 109-114 (U.S.S.R.)

ABSTRACT: The authors formulate analytically requirements for any stereophonic **system to reproduce** without distortion the effect of displacement of the sound source.

Assuming that any n-channel stereophonic system may be considered as a combination of (n - 1) two-channel systems, they restrict their analysis to a two-channel system only. The secondary acoustic field is considered first. Formulae relating the sound intensities I_1 and I_2 and the directional patterns of loudspeakers $\Phi'(\theta_1)$ and $\Phi'(\theta_2)$ to the apparent displacement x' of the source from the microphone are derived, using (1), (2). As shown in (3) $\Phi'(\theta_1)$ and $\Phi'(\theta_2)$ may be assumed to be equal to unity.

The primary field is analysed next. Considering the

Card 1/5

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46-2-3/23

The form of directional pattern of miscrophones for stereophonic sound transmission. (Cont.)

parallel displacement of the sound source with respect to the microphone, it is shown that the first condition for distortionless transmission of sound from a moving source is the equality of normalised displacements of the real and of the apparent sound sources, i.e.

$$\frac{x_1}{l_1} = \frac{x}{l} = x' \qquad (3)$$

which, when applied to the emf of the microphone, may be written:

$$\log \left(\frac{e_1}{e_2} \right)^2 = f(x') \qquad (4)$$

the condition eq.(4) does not satisfy for the phenomenon of the "displacement in depth" of the apparent source, so that the second condition to be satisfied is the elimination of the above effect. It is found that this condition is given by:

$$e_1^2 + e_2^2 = e_0^2 \qquad (6)$$

Card 2/5

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46-2-3/23

The form of directional pattern of microphones for stereophonic sound transmission. (Cont.)

where e_0 is a constant emf. Thus, combining (4), which secures the full use of the frontal displacement of the apparent source, and equation (6), which satisfies for the linearity of its displacements, the law of the microphone's directivity with respect to the source position is given by:

$$\left.\begin{aligned} e_1 &= e_0 \left[10^{-f(x')} + 1\right]^{-1/2} \\ e_2 &= e_0 \left[10^{f(x')} + 1\right]^{-1/2} \end{aligned}\right\} \qquad (7)$$

It is further shown that

$$x' = 1 - \frac{\tan \theta}{\tan \theta_{mean}} \qquad (10)$$

Card 3/5

where θ is the angle between the vertical and the source-to-

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46-2-3/23

The form of directional pattern of microphones for stereophonic sound transmission. (Cont.)

microphone direction (for the parallel relative displacement) and :

$$\tan \theta_{mean} = \frac{l}{y} \qquad (11)$$

where l = half distance between the microphones and y = the distance at which the sound source is displaced parallel to the microphone's line. Also, if in the extreme position ($x = l$), the source produces a pressure p_0 at the microphone, then for its intermediate positions this pressure will be:

$$p_1 = p_0 \Phi'(\theta) \cos\theta \qquad (9)$$

combining eqs. (7) - (10) the required directional characteistics of the microphone is given by:

Card 4/5

$$\Phi(\theta) = \frac{k}{\Phi'(\theta)\cos\theta}\left[10^{-f\left(1 - \frac{\tan\theta}{\tan\theta_{mean}}\right)} + 1\right]^{-1/2} \qquad (12)$$

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46-2-3/23

The form of directional pttern of microphones for stereophonic sound transmission. (Cont.)

where $k = \frac{e_o}{e'_o}$; $e'_o = p_o \varphi_1$ (φ_1 being the microphone sensitivity).

It is shown, therefore, that for a stereophonic sound transmission microphones should possess a highly directional pattern, varying in its characteristics according to the distance between the microphones and the source. Facility for remote control of these characteristics should be provided. 2 diagrams, the graph of the position angle of the apparent source against the difference in energy levels of the transmitting channels and two graphs of required directional patterns of microphones are given. There are 5 references, 1 of which is Slavic.

Card 5/5

ASSOCIATION: Leningrad Institute of Motion Pictures Engineers. (Leningradskiy Institut Kinoinzhenerov)

SUBMITTED: March 1, 1956.

AVAILABLE: Library of Congress

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3"

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

VAKHITOV, YA. SH.

AUTHOR: Vakhitov, Ya., Sh., and Man'kovskiy, V.S. 46-2-4/23

TITLE: Distortions in the reproduction of the sound source movement in stereophonic systems. (Iskazheniya v peredache dvizheniya istochnika zvuka pri stereofonicheskom zvukovosproizvedenii)

PERIODICAL: "Akusticheskiy Zhurnal" (Journal of Acoustics), 1957, Vol.3, No. 2, pp. 115-126 (U.S.S.R.)

ABSTRACT: In the present article the authors investigate analytically distortions in stereophonic reproduction, which distortions are due to the fact that the latitudinal and longitudinal displacements of the apparent source in the secondary field do not correspond to the true displacement of the primary field source. P.G. Tager (1) et al. (2), (4) have shown that the choice of the microphones type and their relative position with respect to the source is of prime importance. Using the notation of the preceding article in this issue (pp.109-114) the authors analyse mathematically first distortion in the reproduction of lateral displacement and derive a formula for the relative change of the total sound level, which determines the distortion in this case. The formula is derived as:

Card 1/4

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

46-2-4/23

Distortions in the reproduction of the sound source movement in stereophonic systems. (Cont.)

$$N_\xi = 10 \log \left[\Phi^2(\theta_1)\cos^2\theta_1 + \Phi^2(\theta_2)\cos^2\theta_2 \right] \qquad (9)$$

For omni-directional microphones it becomes:

$$N_\xi = 10 \log (\cos^2\theta_1 + \cos^2\theta_2). \qquad (10)$$

When bi-directional microphones are used eq. (9) becomes:

$$N_\xi = 10 \log (\cos^4\theta_1 + \cos^4\theta_2) \qquad (11)$$

and for highly directional patterns one obtains:

$$N_\xi = 10 \log \left[\cos^2\theta_1(1 + \cos \theta_1)^2 + \cos^2\theta_2(1 + \cos \theta_2)^2 \right] \qquad (13)$$

Jordan (2) has shown that in order to achieve undistorted reproduction of the longitudinal source movement it is necessary that the difference in sound levels at reproducers change according to a pre-determined law. The formula for the difference in sound levels of two loudspeakers, which determines

Card 2/4

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

46-2-4/23

Distortions in the reproduction of the sound source movement in stereophonic systems. (Cont.)

the position of the apparent source is derived as:

$$N = 20 \log \frac{\Phi(\theta_1) \cos \theta_1}{\Phi(\theta_2) \cos \theta_2} \qquad (16)$$

The equation is analysed for all three directional patterns. Formulae for both longitudinal and latitude displacement distortions have been experimentally verified with good results. The theoretical and experimental results permit the following conclusions: the increase in the relative speaker-to-microphone distance improves the latitude and increases the longitudinal displacement distortions; the magnitude of both types of distortion depends on the microphone directivity and on frequency to the same extent as the directional pattern of the microphone. When microphones are facing each other the latitude displacement effect is somewhat smaller but the distortion of the longitudinal displacement reproduction of the sound picture is made much worse. If the acceptable distortion in latitude movement reproduction is assumed to be acceptable for the total level variation of 3 to 4 db and the longitudinal movement distortion

Card 3/4

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46-2-4/23

Distortions in the reproduction of the sound source movement in stereophonic systems. (Cont.)

acceptable for 10% change in the lateral distance, the (y/l latitude to longitude distance) ratio for non-directional microphones should be 0.6 to satisfy the first condition and 0.1 to satisfy the second. A compromise value of $y/l = 0.3 \div 0.5$ is usually used, for which the total sound level variation to be expected would be $5 \div 9$ db for the shortening of the lateral apparent sound distortion of $20 \div 40\%$. For the uni-directional microphones the ratio $y/l = 0.7$ should be adopted with the corresponding level variation of $3 \div 5$ db and lateral displacement shortened by not more than 20%. For bi-directional microphones $y/l = 0.8 \div 1.0$, with level variations of $3 \div 4$ db and lateral displacement shortening of $10 \div 20\%$. One diagram of relative microphones and source positions and 18 grahs of numerical and experimental results are given. There are 4 reference, of which 1 is Slavic.

Card 4/4

ASSOCIATION: Leningrad Institute of Motion Picture Engineers. (Leningradskiy Institut Kinoinzhenerov)

SUBMITTED: March 1, 1956.

AVAILABLE: Library of Congress

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VAKHITOV, Ya. Sh.

46-4-13/17

AUTHOR: Vakhitov, Ya.Sh.

TITLE: A Ballistic Reverberometer with a Small Spread of Readings. (Ballisticheskiy reverberometr s malym razbrosom pokazaniy)

PERIODICAL: Akusticheskiy Zhurnal, 1957, Vol.III, Nr 4, pp.372-373 (USSR)

ABSTRACT: A block diagram of the reverberometer is shown in Fig.1. The sound signal from the microphone, 1, is fed into the amplifier, 2, and the detector, 3, and then to a logarithmic device, 4, the output of which is connected to the integrating element, 6. The level at the output of the integrating element is controlled by the device 5, while 7 is the ballistic indicator of reverberation. The integrating element is shown in Fig.2. If the time constant of this circuit is sufficiently large then the potential difference across the capacitor is approximately proportional to the integral of the input potential difference. Thus such a circuit, in distinction to a thermoelement, produces a linear integration. The logarithmic device, 4, is used to lower the effect of fluctuations on the readings of the reverberometer, i.e., to reduce the spread of readings. This is due to the fact that, at the output of this device, the magnitude of the fluctuations does not change with a change

Card 1/2

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A Ballistic Reverberometer with a Small Spread of Readings.

in the level, and the mean value of the fluctuations is close to zero. The logarithmic device consists of a triode DC amplifier in series with a large resistance. Since the grid current characteristic is exponential the voltage between the grid and the cathode of the valve is a logarithmic function of the input voltage. The instrument was found sufficiently accurate and convenient in practice. There are 2 figures.

ASSOCIATION: Leningrad Institute for Cine-engineering (Leningradskiy institut kinoinzhenerov)

SUBMITTED: February 19, 1957.

AVAILABLE: Library of Congress.

Card 2/2 1. Reverberometer-Operation 2. Reverberometer-Characteristics

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

2(3) SOV/119-59-4-11/18

AUTHOR: Vakhitov, Ya. Sh., Candidate of Technical Sciences

TITLE: A Novel Ballistic Reverberometer (Novyy ballisticheskiy reverberometr)

PERIODICAL: Priborostroyeniye, 1959, Nr 4, pp 21-23 (USSR)

ABSTRACT: The ballistic principle has in spite of its simplicity not found a widespread application in reverberation measurements, as it has inherent errors of measurement. These errors are due to the following facts: 1) a considerable straying of the deflections of the instrument in different positions due to the fluctuation of sound attenuation. 2) by the small depth of integration of the reverberation process. These error causes are almost completely eliminated in the reverberometer developed by the author. The principal circuit diagram of this instrument is given in a figure. The sound signal which has been transduced by a microphone is fed into an amplifier, which drives a logarithmic circuit, the output of which is connected to an integrating device. This finally feeds the ballistic reverberation indicator. A circuit proposed by N. Ya. Batyrev is used as an integrating element

Card 1/2

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instead of a thermocouple. The calculation of the linearly integrating circuit is outlined. The current passing through this circuit varies as the pressure, and hence the errors of the individual measurements can be compensated statically. In the reverberometer under discussion the errors of the individual measurements can be minimized by means of the logarithmic device. A d. c. amplifier with a triode is used as logarithmic device. A figure illustrates the principal circuit diagram of the reverberometer. The tests carried out with this instrument confirmed its reliability. The results of individual measurements deviate by no more than 10 % from the average value and the results of measurements taken at individual points practically do not differ at all. A measurement at 5 to 6 points guarantees an accuracy sufficient for practical purposes. There are 3 figures and 2 Soviet references.

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VAKHITOV, Ya.Sh.

Theory of the two-sided electrostatic symmetrical loudspeaker. Trudy LIKI no. 5:76-81 '59. (MIRA 13:12)

1. Kafedra akustiki Leningradskogo instituta kinoinzhenerov. (Loudspeakers)

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"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001858410010-3

S/0046/64/010/002/0242/0244

ACCESSION NR: AP4039287

AUTHOR: Vakhitov, Ya. Sh.

TITLE: Highly sensitive subsonic microphone with a movable coil

SOURCE: Akusticheskiy zhurnal, v. 10, no. 2, 1964, 242-244

TOPIC TAGS: microphone, infrasound, sensitivity, coil, frequency, resonator, membrane

ABSTRACT: The author developed a highly sensitive receiver for a relatively narrow frequency band. Because it is intended for field work, the instrument was made resistant to changing atmospheric conditions. The receiver constitutes a microphone with a movable coil. Its cross section and schematic drawing are shown in Fig. 1 on the Enclosures. Aside from the standard elements, the receiver contains a resonator involving the air in the hole within the core m_3 and acoustic compliance C_3 of air in an auxiliary space. If the frequency of the resonator is properly adjusted, the microphone acquires the properties of the band filter shown in Fig. 2 of the Enclosures. The upper limit of frequency range is determined by m_1C_1 and $m_2'C_2'$ and the lower limit by $\omega_H \approx 1/\sqrt{m_1' \cdot C_1}$. The decrease of frequency ω_H may be attained by

Card 1/2

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