SOV/124-57-3-3432

Translation from: Referativnyy zhurnal. Mekhanika, 1957, Nr 3, p 115 (USSR)

AUTHOR: Arzhanykh, I. S.

TITLE: The Structure of the Displacement Vector in Boundary Problems of the Dynamics of an Elastic Body (Struktura vektora smeshcheniya granichnykh zadach dinamiki uprugogo tela)

PERIODICAL: Tr. Sredneaz. un-ta, 1956, Nr 66, pp 3-20

ABSTRACT: A study is made of the expressions representing the displacement vector of a point of an elastic body which satisfies the dynamic vector equation of Lamé for arbitrary initial conditions and two kinds of boundary conditions: (a) When the displacements are given for the surface of the body (first problem), and (b) when the total normal derivative is given for the surface of the body (second problem). Functional equations determining the displacement vector are drawn up in conformity with these boundary problems. Representations of the displacement vector by wave functions are studied. In conclusion, integro-differential equations are presented for both the first and the second boundary problem. It is pointed out that by means of a Laplace transformation the integro-differential equations of the first problem

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The Structure of the Displacement Vector in Boundary Problems (cont.)

are reduced to integral equations. The whole paper is a development of the author's investigations published in publications issued by the Academy of Sciences, Uzbek SSR, from 1951 to 1954. The paper does not contain any actual examples illustrating the application of the methods proposed by the author. Most of the intermediate calculations are left out.

N. A. Kil'chevskiy

Card 2/2

ARZHANYKH, I.S.

USSR/Theoretical Physics - Classical Electrodynamics. B-3

Abs Jour : Ref Zhur - Fizika, No 4, 1957, 8397

Author : Arzhanykh, I.S.

Inst :

Title : Field Method in the Theory of Hyperbolic Systems of Differential Equations of Mathematical Physics.

Orig Pub : Tr. 3-go Vses. matem. s"ezda, T.I.M., AN SSSR, 1956, 42

Abstract : Resume of a lecture. The methods developed by the author for solving the problem of determining the vector from its curl and divergence, which make it possible to express the field in terms of the boundary values, are used to determine the solutions of the Maxwell, Proch, and other equations. The author studies the properties of the resultant retarded potentials and writes down the integra-differential equations for the boundary problems. A physical interpretation is given for singly and doubly retarded potentials.

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ARZHANYKH, I. S.

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1631
AUTHOR ARŽANYCH, I.S.
TITLE On the Chainlike Systems of the Meson Field.
PERIODICAL Dokl.Akad.Nauk, 110, fasc.3, 351-354 (1956)
Issued: 12 / 1956

The existence of mesons with different masses, velocities, and charges suggests the study of a system of equations for the meson field. Here two possible varieties of this problem are investigated: 1.) The field has a mass spectrum in the case of one and the same velocity of the mesons. 2.) The field has a velocity spectrum in the case of a given mass of the particles. The mass spectrum is here characterized by a constant matrix and the field equations are written down according to the PROCA system:

$$\mathrm{div}\,\vec{\mathcal{E}}_i = -ik_o^2 \sum_{k=1}^{N} \mu_{ik} \Phi_k + P_i,\ \mathrm{curl}\,\vec{\mathcal{H}}_i = -k_o^2 \sum_{k=1}^{N} \mu_{ik} \vec{A}_k + J_i = (1/c)\,\partial \vec{\mathcal{E}}/\partial t.$$

$$_i = \mathrm{curl}\,\vec{A}_i,\ \vec{\mathcal{E}}_i = -\nabla \Phi_i - (1/c)\partial \vec{A}_i/\partial t,\ k_o = m_o c/\hbar,\ i = 1,2,\dots,N.$$

In the same way $\beta = \beta \| \beta_{ik} \|_1^N$ is assumed to characterize the spectrum of velocities, and the field is then described by an analogous system of equations. The scalar characteristic of the field is in the first case given by a system of KLEIN'S equations: $\Delta \Psi_i - (1/c^2)\,\partial^2 \Psi_i/\partial t^2 - k_o^2 \sum_{k=1}^{N} \mu_{ik} \Psi_k = F_i$
and in the second case by an analogous system:

$$\Delta \Psi_i - (1/c^2) \sum_{k=1}^{N} \gamma_{ik}\ \partial^2 \Psi_k/\partial t^2 - k_o^2 \Psi_i = F_i$$

Dokl.Akad.Nauk, 110, fasc.3,351-354 (1956) CARD 2 / 2 PA - 1631

Here the meson field is represented explicitly by the boundary elements on the basis of the results obtained by I.S.ARŽANYCH, Dokl.Akad.Nauk.No 4 (1956).

At first the system that corresponds to the mass spectrum is investigated and reduced to the canonic form. Here two cases must be distinguished: Either all roots of the characteristic polynomial are simple, or there exist also multiple roots. In the first case the system is divided into N single PROCA systems. In the degenerated case the original system is divided into p linked systems. Both systems are explicitly written down. As p systems of the same type are obtained, it is sufficient to investigate one of them. On this occasion a representation of the field is obtained by retarded potentials. The structure of the meson field of the linked system is explicitly written down.

Next, the field with the velocity spectrum is investigated. Also here the matrix is reduced to the canonic form. If the corresponding polynomial has simple roots, the original system of equations is divided into N systems. In the case of multiple roots p linked systems are obtained as above. One of them is examined. The structure of the meson field with velocity spectrum is explicitly written down. In the end, a formula for the scalar field is obtained with utilization of the boundary elements.

INSTITUTION: Institute for Mathematic and Mechanic "V.I.ROMANOVSKIJ" of the Academy of Science of the Uzbek SSR

~~ARZANYKH, I.S.~~ ARZANYKH, I.S.

SUBJECT USSR / PHYSICS CARD 1 / 3 PA - 1792
AUTHOR ARZANYCH, I.S.
TITLE The Representation of the Meson Field by Retarded Potentials.
PERIODICAL Dokl.Akad.Nauk, 110, fasc.6, 953-956 (1956)
Issued: 1 / 1957

The aim of this report is the integral representation of the vectors $\vec{E}$ and $\vec{H}$ of the electromagnetic field as well as of the potentials φ and A with the help of special retarding potentials which correspond to KLEIN's operator $\nabla^2 - k^2 - (1/c^2)\partial^2/\partial t^2$. Here the method for integral representation, which was employed in connection with other operators in the elasticity theory, hydrodynamics, and electrodynamics, was applied. With k = 0 the formulae of MAXWELL'S electrodynamics result from the formulae mentioned below, and the second group of the formulae for $\vec{E}$ and $\vec{H}$ then goes over into KIRCHHOFF'S formulae. In connection with the problems under investigation the integrodifferential equations of the boundary value problems belonging to KLEIN'S equation are constructed. The retardation operator corresponding to the meson field is:

$$\{\vec{v}(q,t) \equiv \frac{\vec{v}(q,t-r/c)}{r(p,q)} - k\int_0^\infty \frac{J_1(k\xi)}{\sqrt{\xi^2-r^2}}\,\vec{v}\left(q,t - \frac{\sqrt{\xi^2+r^2}}{c}\right) d\xi$$

The following lemma applies: The field vector $\vec{v}(q,t)$, which satisfies the equations curl $\vec{v} = \Omega$ and div $\vec{v} = \Theta$ within the domain Q + S, satisfies also

Dokl.Akad.Nauk,110,fasc.6,953-956 (1956) CARD 2 / 3 PA - 1792

the equation $4\pi\vec{v}(p,t) = (k^2+(1/c^2)\partial^2/\partial t^2)\int \{\vec{v}\}\, dQ + \nabla\phi - \text{curl}\,\vec{F}$

with $\phi(p,t) = \oint \vec{n}\,\{\vec{v}(s,t)\}\, dS - \int \{\theta(q,t)\}\, dQ$

and $\vec{F}(p,t) = \oint \vec{n} \times \{\vec{v}(s,t)\}\, dS - \int \{\Omega(q,t)\}\, dQ$.

The following theorem then applies: The electromagnetic meson field (?) is determined by its limiting elements in the following form:

$4\pi\vec{E}(p,t) = \nabla \oint \vec{n}\,\{\vec{E}\}\, dS - \text{curl} \oint \vec{n} \times \{\vec{E}\}\, dS + \oint \vec{n}\,\{\text{div}\,\vec{E}\}\, dS +$
$+ (1/c)(\partial/\partial t) \oint \vec{n} \times \{\vec{H}\}\, dS$, $4\pi\vec{H}(p,t) = \nabla \oint \vec{n}\,\{\vec{H}\}\, dS -$
$\text{curl} \oint \vec{n} \times \{\vec{H}\}\, dS - \oint \vec{n} \times \{\text{curl}\,\vec{H}\}\, dS$,

and the potentials are determined by the following formulae:

$k^2\varphi = -\,\text{div}\,\vec{E}$, $k^2\vec{A} = (1/c)\partial\vec{E}/\partial t - \text{curl}\,\vec{H}$. On this occasion the vectors $\vec{E}$ and $\vec{H}$ are expressed by the limiting elements for the potentials:

Dokl.Akad.Nauk, 110,fasc.6,953-956 (1956) CARD 3 / 3 PA - 1792

$$4\pi\vec{E} = k^2 \oint \vec{n}\,\{\varphi\}\,dS + (1/c)(\partial/\partial t)\oint \vec{n} \times \{\mathrm{curl}\,\vec{A}\}\,dS -$$
$$- \nabla \oint \vec{n}\,(\nabla\varphi + (1/c)\partial\vec{A}/\partial t)\,dS + \mathrm{curl}\oint \vec{n} \times \{\nabla\varphi + (1/c)\partial\vec{A}/\partial t\}\,dS$$
$$4\pi\vec{H} = \oint \vec{n} \times \left\{\frac{1}{c}\frac{\partial}{\partial t}\nabla\varphi + \left(k^2 + \frac{1}{c^2}\frac{\partial^2}{\partial t^2}\right)\vec{A}\right\} dS +$$
$$+ \nabla \oint \vec{n}\,\{\mathrm{curl}\,\vec{A}\}\,dS - \mathrm{curl}\oint \vec{n} \times \{\mathrm{curl}\,\vec{A}\}\,dS$$

There follows the proof of this theorem and a conclusion drawn therefrom. A further theorem says that the function Ψ which satisfies the equation $(\nabla^2 - k^2 - (1/c^2)\,\partial^2/\partial t^2)\,\Psi = 0$ is represented by its limiting elements in the form: $4\pi\Psi(p,t) = \oint \{\partial\Psi/\partial n\}\,dS - \oint [\Psi]\,dS$. The latter formula introduces the potential of a simple layer and of a double layer, which at $k = 0$ go over into NEWTON'S retarded potential.

INSTITUTION: Institute for Mathematics and Mechanics "V.I.ROMANOVSKIJ" of the Academy of Science of the Uzbekian SSR.

ARZHANYKH, I.S.

Field of a moving charge. Dokl. AN Uz. SSR no.7:5-10 '57.
(MIRA 11:5)

1. Institut matematiki i mekhaniki AN UzSSR im. V.I. Romanovskogo.
Predstavleno akademikom AN UzSSR S.U. Umarovym.
(Electric fields) (Relativity (Physics))

ARZHANYKH, I.S.

Intrinsic fields around moving charges. Dokl. AN Uz. SSR 11:5-9 '57. (MIRA 11:5)

1. Institut matematiki i mekhaniki im. V.I. Romanovskogo AN UzSSR. Predstavleno akad. AN UzSSR S.U. Umanrovym.
(Electric charge and distribution)
(Electromagnetic theory)

ARZHANYKH, I.S.

Vortex-motion equations of polytropic gases. Trudy Inst. mat. i mekh. AN Uz. SSR no.21:29-34 '57. (MIRA 11:6)
(Differential equations, Partial (Vortex motion))

ARZHANYKH, I.S.

Direct proof of the theorem on the universal meaning of contact transformations. Trudy Inst. mat. i mekh. AN Uz. SSR no.21:35-39 '57. (MIRA 11:6)

(Transformations (Mathematics)) (Differential equations partial)

ARZHANYKH, I.S.; BOLDINSKIY, G.I.; ZEL'TIN, A.I.

A significant error in designs of some pneumatic cotton harvesters. Izv. AN Uz.SSR. Ser.tekh.nauk no.2:59-62 '58. (MIRA 11:9)

1. Institut matematiki i mekhaniki im. V.I. Romanovskogo AN UzSSR.
(Cotton picking machinery)

ARZHANYKH, I.S.

Mathematical extension of mechanics. Dokl. AN Uzb. SSR no.3:5-11 '58. (MIRA 11:6)

1. Institut matematiki i mekhaniki im. V.I. Romanovskogo AN UzSSR. Predstavleno akademikom AN UzSSR T.N. Kary-Niyazovym.
(Mathematical physics) (Mechanics)

ARZHANYKH, I.S.

Motion equations of the electromagnetic dipole. Dokl. AN Uz.SSR no.5:5-8 '58. (MIRA 11:8)

1. Institut matematiki i mekhaniki im. V.I. Romanovskogo AN UzSSR. Predstavleno akademikom AN UzSSR S.U. Umarovym.
(Dipole moments)

ARZHANYKH, I.S.

Characteristics of quantum equations. Dokl.AN Uz.SSR no.9:5-9 '58. (MIRA 11:12)

1. Institut matematiki i mekhaniki im. V.I.Romanovskogo. Predstavleno akademikom AN UzSSR T.N.Kary-Niyazovym.
(Quantum theory)

16(1),24(5)

AUTHOR: Arzhanykh, I.S. SOV/166-59-3-8/11

TITLE: Quantum Mechanics as an Analytic Continuation of Classical Mechanics

PERIODICAL: Izvestiya Akademii nauk Uzbekskoy SSR, Seriya fiziko-matematicheskikh nauk, 1959, Nr 3, pp 52-64 (USSR)

ABSTRACT: The equation $F(w) = 0$, where

$$(4) \qquad F(w) \equiv \frac{\partial w}{\partial t} + H(t, x_1, \dots, x_n, \frac{\partial w}{\partial x_1}, \dots, \frac{\partial w}{\partial x_n})$$

and H is the canonical potential of Hamilton, is satisfied strongly in analytic dynamics and hydrodynamics, while it holds only approximately in quantum mechanics. The author asks the question: Is it possible to construct an operator $K(\Omega)$ which for functions of the class C^1 from the equation $K(\Omega) = 0$ would lead to the strong equation $F(w) = 0$ and from the equation $\delta I(\phi) = 0$, where

$$(7) \qquad I(\phi) = \int_{t_1}^{t_2} dt \int_{w_1}^{w_2} dw \int \dots \int K(\phi) dQ$$

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for $\phi \in C^2$ would lead to the Schrödinger equation

(8) $(\frac{h}{i} \frac{\partial}{\partial t} + H^{*})\psi = 0,$

where H^{*} is an operator of quantum mechanics?
The question is answered in the affirmative. K has to be chosen in the form

(9) $K(\Omega) \equiv - \frac{\partial \Omega}{\partial t} \frac{\partial \Omega}{\partial w} + (\frac{\partial \Omega}{\partial w})^2 H(t, x_1, \ldots, x_n, p_1, \ldots, p_n)$

and the impulse field in the form

(10) $p_\nu = - \frac{\partial \Omega}{\partial x_\nu} : \frac{\partial \Omega}{\partial w}$.

The Hamilton-Jacobi equation $F(w) = 0$ arises from $K(\Omega) = 0$ by an addition of the condition $\Omega(t, x_1, \ldots, x_n, w) = 0$, while (8) follows from $\delta I = 0$ with the following substitution

(12) $\phi = \psi(t, x_1, \ldots, x_n) \exp(\frac{w}{ih})$.

Quantum Mechanics as an Analytic Continuation Classical Mechanics SOV/166-59-3-8/11

Then the author considers in relativistic approximation systems of particles which reciprocate, further the relativistic equation of an electron, and the equation of Gordon-Schrödinger. He shows the universality of the proposed algorithm and therewith it is proved that the quantum mechanics can be understood as an analytic continuation of the classical mechanics. There are 7 references, 6 of which are Soviet, and 1 American.

ASSOCIATION: Institut mekhaniki AN Uz SSR (Institute of Mechanics, AS Uz SSR)

SUBMITTED: December 16, 1958

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30(1),16(2) 06558

SOV/166-59-4-9/10

AUTHORS: Arzhanykh,I.S., Rozenblyum,L.M., Landsman,M.I.,and Kel'bert,S.L.

TITLE: On the Threefold Treatment of the Cotton Shrub by the Cotton Harvester With Vertical Spindles

PERIODICAL: Izvestiya Akademii nauk Uzbekskoy SSR, Seriya fiziko-matematicheskikh nauk,1959, Nr 4, pp 64-69 (USSR)

ABSTRACT: The authors describe the results of experiments carried out on November 17-28,1958 on the fields of the Scientific Research Institute for Mechanization and Electrification of the AS Kh N Uz SSR by the laboratory of mechanical cotton harvesters of the Institute of Mathematics and Mechanics at the AS Uz SSR, in order to examine the working of the new cotton harvesters SKhM-48M-ANT-1 and 2 which have an additional pair of spindle barrels and perform a threefold treatment of the shrub. The maximal harvest (88.9%) reached SKhM-48M-ANT-1. Because of the satisfactory results corresponding agricultural machines shall be constructed. The question of the multiple treatment of the shrub was firstly treated by L.M.Rozenblyum in 1949 (patent Nr 86 314, 1949). There are 3 tables and 3 figures.

ASSOCIATION: Institut mekhaniki AN Uz SSR (Institute of Mechanics AS Uz SSR)

SUBMITTED: April 2, 1959

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ARZHANYKH, I.S.

Boundary conditions of quantum mechanics. Dokl.AN Uz.SSR no.8:7-10 '59. (MIRA 12:11)

1. Institut AN UzSSR. Predstavleno akademikom AN UzSSR S.V. Starodubtsevym.
(Quantum theory)

ARZHANYKH, I.S.; GUMEROV, Sh.A.

Conditions governing the applicability of a potential method for integrating equations for the motion of nonhomologous systems in a case where the Hamilton function clearly depends on time. Dokl. AN Uz.SSR no.10:3-6 '59 (MIRA 13:3)

1. Institut mekhaniki AN UzSSR i Institut inzhenerov irrigatsii i mekhanizatsii sel'skogo khozyaystva. Predstavleno akademikom AN UzSSR T.N. Kary-Niyazovym.
(Differential equations)

24 (5)

AUTHOR: Arzhanykh, I. S. SOV/20-125-6-10/61

TITLE: On the Differential Equations in the Motion of a Meson Charge (O differentsial'nykh uravneniyakh dvizheniya mezonnogo zaryada)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 6, pp 1215-1218 (USSR)

ABSTRACT: A meson with the rest mass μ and the charge ε is assumed to move with the velocity $\vec{v}(t,\vec{r})$, and to produce the charge density $\varrho(t,\vec{r})$, the current $\vec{J}(t,\vec{r})$, and the electromagnetic field $\vec{E}$, $\vec{H}$. The electromagnetic field is determined by means of the scalar potential Φ and the vectorial potential $\vec{A}$ from the Proca-equations $\vec{E} = -\frac{1}{c}\frac{\partial A}{\partial t} - \mathrm{grad}\,\Phi$, $\mathrm{div}\,\vec{E} = -K^2\Phi + \varrho$, $\vec{H} = \mathrm{curl}\,\vec{A}$, $\mathrm{curl}\,\vec{H} - \frac{1}{c}\frac{\partial \vec{E}}{\partial t} = -k^2\vec{A} + \frac{1}{c}\vec{J}$, where $k = 2\pi\mu c/h$ holds. The motion satisfies the law $\frac{d}{dt}\left(\frac{\partial T}{\partial \dot{\vec{r}}}\right) - \frac{\partial T}{\partial \vec{r}} = \vec{F}$,

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On the Differential Equations in the Motion of a Meson Charge SOV/20-125-6-10/61

$T = -\mu c^2\left(1 - \frac{v^2}{c^2}\right)^{\frac{1}{2}}$, and the force $\vec{F}$ is determined by the Lorentz formula. The present paper is intended to determine the quantities ϱ, $\vec{j}$, Φ, $\vec{A}$, $\vec{E}$, $\vec{H}$ from the system consisting of the above-mentioned equations. The author here employs the methods he developed in one of his earlier papers (Ref 1). If the potentials satisfy the Lorentz condition $\frac{1}{c}\frac{\partial \Phi}{\partial t} + \operatorname{div}\vec{A} = 0$, the continuity equation $\frac{\partial \varrho}{\partial t} + \operatorname{div}\vec{j} = 0$ is satisfied. The proof of this assertion is briefly outlined. Next, expressions are derived for Φ and $\vec{A}$:

$$\Phi = -\frac{1}{\varepsilon}\left(\frac{\mu c^2}{\sqrt{1 - v^2/c^2}} + \frac{\partial w}{\partial t}\right), \quad \vec{A} = -\frac{c}{\varepsilon}\left(\frac{\mu\vec{v}}{1 - v^2/c^2} - \operatorname{grad} w\right).$$

Also a partial differential equation for determining the arbitrary function w is written down. In the second part of this article the author gives an example for the application of the equations deduced in the first part. The "solving

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equations" are written down in spherical coordinates, and the functions w and $\vec{\vartheta}$ are assumed to depend only on the distance up to a fixed point: $v_r = v(r)$, $v_\theta = 0$, $v_\varphi = 0$ (radial motion of the meson). Besides, the motion is assumed to develop with sufficient slowness $(v^2/c^2) = 0$. Under these conditions is found for the potentials $\Phi = -\frac{1}{2}\frac{\mu}{\varepsilon} v^2 + \text{const}$, $A_r = -\frac{c}{\varepsilon}\left(\mu v - \frac{dw}{dr}\right)$, $A_\theta = 0$, $A_\varphi = 0$; for the electromagnetic field $E_r = -\frac{2\mu a^2}{\varepsilon}\frac{1}{r^5}$, $E_\theta = E_\varphi = 0$, $H_r = H_\theta = H_\varphi = 0$, for the Lorentz force $F_r = \varepsilon E_r = -\frac{2\mu a^2}{r^5}$, $F_\theta = F_\varphi = 0$, and for the charge density $\varrho = \operatorname{div}\vec{E} + k^2\Phi = \frac{\mu a^2}{\varepsilon}\frac{1}{r^4}\left(\frac{6}{r^2} - \frac{k^2}{2}\right)$.

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On the Differential Equations in the Motion of a Meson Charge SOV/20-125-6-10/61

At the distance $r_o = \frac{\sqrt{3}}{7} \frac{h}{\mu c}$ from the fixed point, which may be considered to be the center of the atomic nucleus, density becomes equal to zero, and with a further increase of the effective radius of the meson, even an unreal function. The sphere with the radius r_o may be described as an exchange-zone. This zone is located entirely in the interior of the nucleus. According to the here discussed scheme of the slow motion of a meson, the force acting upon this meson is inversely proportional to the 5. power of the distance as calculated from the nuclear center. In the relativistic case the Yukava-force is one of the particular solutions. There are 2 Soviet references.

ASSOCIATION: Institut matematiki i mekhaniki imeni V. I. Romanovskogo Akademii nauk UzSSR (Institute for Mathematics and Mechanics imeni V. I. Romanovskiy of the Academy of Sciences of the UzbekSSR)

Card 4/5

On the Differential Equations in the Motion of a Meson Charge SOV/20-125-6-10/61

PRESENTED: January 8, 1959, by N. N. Bogolyubov, Academician

SUBMITTED: October 12, 1957

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24 (5)

AUTHOR: Arzhanykh, I. S. SOV/20-126-1-11/62

TITLE: An Algorithm of Quantum Mechanics (Ob odnom algorifme kvantovoy mekhaniki)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 1, pp 45-48 (USSR)

ABSTRACT: § 1: The necessity of the algorithm: The problems of classical mechanics and quantum mechanics are solved by different methods. This difference is principally caused by the fact that in the former case the partial differential equation (of first order) by Hamilton-Jakobi $\frac{\partial w}{\partial t} + H(t, q_1, \dots, q_n, \frac{\partial w}{\partial q_1}, \dots, \frac{\partial w}{\partial q_n}$ must be integrated, in the latter case the Schrödinger equation (of second order) $\left(\frac{h}{i}\frac{\partial}{\partial t} + \mathcal{H}\right)\Psi = 0$. The method by Dirac (Refs 3, 4, 5) is only applicable to one single particle, and leads to a system of equations of the Schrödinger type. Other procedures give even more complicated equations in the relativistic case. Therefore, the problem has existed for a long time which structure the operator $\mathcal{H}$ has in the

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relativistic case. Such a universal algorithm, however, is of essential importance to the further development of quantum mechanics. This universal algorithm is to facilitate, in all cases, the construction of the operator $\mathcal{H}$ of the equation $\left(\frac{h}{i}\frac{\partial}{\partial t} + \mathcal{H}\right)\Psi = 0$ from the function H of Hamilton-Jakobi's theory. It is more convenient to set the problem within a larger scope, namely concerning the construction of a universal algorithm which delivers both the equations of classical mechanics and those of quantum mechanics. This produces a synthesis of classical and quantum mechanics making it clear where there is the difference and the connection between the Hamilton-Jakobi and the Schrödinger equations. Such an algorithm is pointed out in the present paper.

§ 2: The author constructs the operator K over the functions $\Omega(t,w,q_1,\ldots q_n)$ of a certain family ($\Omega \in C^1$ for classical mechanics and $\Omega \in C^2$ for quantum mechanics). This operator K has the following properties: In the realization of the one kind of conditions connected with the operator K, the equations of classical mechanics must result; but in the realization of

An Algorithm of Quantum Mechanics

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the other conditions, the Schrödinger equation is the result. For the matter of shortness, the author puts T equal to $\partial\Omega/\partial t$, $W = \partial\Omega/\partial w$, $Q_\nu = \partial\Omega/\partial q_\nu$, and chooses the operator K in the form: $K(\Omega) \equiv - TW + W^2H(t,q_1,\dots,q_n, -\frac{Q_1}{W},\dots,-\frac{Q}{W})$. By means of this operator, he then constructs the functional $I(\Omega) \equiv \int_{t_1}^{t_2}dt\int_{w_1}^{w_2}dw \int_{(Q)} K(\Omega)dQ$. (Q) denotes the reference configuration space $dQ = g(q_1,\dots,q_n)dq_1\dots dq_n$. The algorithm suggested here consists of the following: The conditions $K(\Omega) = 0$, $\Omega(t,w,q_1,\dots,q_n) = 0$ apply to classical mechanics, and the conditions $\delta I = 0$, $\Omega = \Psi(t,q_1,\dots,q_n)\exp(-iw/h)$ to quantum mechanics. The Hamilton-Jakobi equation is equivalent to the conditions $K(\Omega) = 0$, $\Omega(t,w,q_1,\dots,q_n) = 0$, and the equation $\left(\frac{h}{i}\frac{\partial}{\partial t} + \mathcal{H}\right)\Psi = 0$ corresponds to the condition that the functional I, in the presence of a periodicity, is periodical with the period $2\pi h$ with respect to the effect w. The formulas

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for the classical and for the quantum-mechanical case are then explicitly derived; an expression for χ in the quantum-mechanical case is also indicated. Finally, the universal character of the algorithm introduced is pointed out in the following 3 examples: Schrödinger equation, relativistic equation, system of interacting particles. There are 7 Soviet references.

ASSOCIATION: Sredneaziatskiy gosudarstvennyy universitet im. V. I. Lenina (Central Asian State University imeni V. I. Lenin)

PRESENTED: January 15, 1959, by N. N. Bogolyubov, Academician

SUBMITTED: December 27, 1958

GREBENYUK, D.G.; ARZHANYKH, I.S., otv.red.; YAKOVENKO, Ye.P., red.izd-va; GOR'KOVAYA, Z.P., tekhn.red.

[Polynomials of optimum approximation whose coefficients are bound up by linear relationships] Polinomy nailuchshego priblizheniia, koeffitsienty kotorykh sviazany lineinymi zavisimostiami. Tashkent, Izd-vo Akad.nauk Uzbekskoi SSR, 1960. 235 p. (MIRA 14:4)

1. Chlen-korrespondent AN UzSSR (for Arzhanykh).
(Polynomials)

ARZHANYKH, I.S.

PHASE I BOOK EXPLOITATION SOV/4796

Akademiya nauk Uzbeksoy SSR, Tashkent. Institut matematiki i mekhaniki

Issledovaniya po matematicheskomu analizu i mekhanike v Uzbekistane (Research in Mathematical Analysis and Mechanics in Uzbekistan) Tashkent, Izd-vo AN Uzbekskoy SSR, 1960. 259 p. Errata slip inserted. 1,000 copies printed.

Sponsoring Agency: Akademiya nauk Uzbekskoy SSR. Institut matematiki i mechaniki imeni V.I. Romanovskogo.

Resp. Ed.: I.S. Arzhanykh, Corresponding Member, Academy of Sciences UzSSR; Ed.: I.G. Gaysinskaya; Tech. Ed.: Z.P. Gor'kovaya.

PURPOSE: This collection of articles is intended for mathematicians, mechanics, aspirants, and students taking advanced courses in divisions of physics and mathematics at universities and pedagogical schools of higher education.

COVERAGE: The collection contains 17 articles dealing with the results of investigations on the theory of integrating differential equations im mathematical physics and mechanics, the theory of numbers, and the problem of the best approximation of functions. Individual articles discuss elasticity, flow close to a

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rotating disk, transverse vibrations of beams, motion of an automobile after impact, thermal stress, etc. No personalities are mentioned. References accompany 14 articles.

TABLE OF CONTENTS:

9,3700

S/044/61/000/011/002/049
C111/C444

AUTHOR: Arzhanykh, I. S.

TITLE: On the deformation of the time-space under the influence of the electro-magnetic field

PERIODICAL: Referativnyy zhurnal, Matematika, no. 11, 1961, 57, abstract 11A398("Issled. po matem. analizu i mekhanike v Uzbekistane". Tashkent, AN UzSSR, 1960, 5 - 16)

TEXT: The present article contains tranformation formulas for the quantities of the electromagnetic field under transformations of the coordinates, being more general than the Lorentz ones. The author assumes that the existence of the electromagnetic field leads to changes of the properties of the space, being analogous to the processes in the elastic medium, and he defines the "deformation tensor of the space", the "tension tensor of the space", as well as the corresponding "Lamé equations".

[Abstracter's note: Complete translation.]

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A104/A133

24.4200

AUTHORS: Arzhanykh, I. S., Corresponding Member of the Academy of Sciences of the UzSSR and Nasretdinov, S.S.

TITLE: Surface stresses of isotropic elastic solids.

PERIODICAL: Akademiya nauk UzSSR, Izvestiya. Seriya tekhnicheskikh nauk, no. 6 1960, 27 - 35

TEXT: The authors referring to the computation method for the determination of surface stresses on elastic solids (Ref. 1: I. S. Arzhanykh, Izvestiya Akademii nauk UzSSR, 1952, no. 2) give a detailed description of the mathematical process of this problem explaining it by examples. Stresses are determined according to the Hooke's law:

$$p_{nn} = \lambda \operatorname{div} \vec{U} + 2\mu e_{nn}$$
$$p_{mn} = \mu e_{mn} \quad (n, m = 1, 2, 3) \tag{1}$$

where $\operatorname{div} \vec{U} = \frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} + \frac{\partial w}{\partial z} = e_{11} + e_{22} + e_{33}$ = volumetric expansion; p_{mn} = stress

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tensor component; e_{mn} = strain tensor component and λ, μ = Lame constant. At the investigation of the surface $\vec{r} = \vec{r}(\alpha, \beta)$ with coordinates relevant to the curvature lines, three basic metric forms [Ref. 2: S. P. Finikov, Teoriya poverkhnostey, M.-L., GONTI, 1953] are derived

$$\left.\begin{aligned} I &= \vec{dr}^2 = \vec{r}_\alpha^2\, d\alpha^2 + \vec{r}_\beta^2\, d\beta^2 \\ II &= -(\vec{dn}, \vec{dr}) = \frac{\vec{r}_\alpha^2}{R_1}\, d\alpha^2 + \frac{\vec{r}_\beta^2}{R_2}\, d\beta^2 \\ III &= \vec{dn}^2 = \frac{\vec{r}_\alpha^2}{R_1^2}\, d\alpha^2 + \frac{\vec{r}_\beta^2}{R_2^2}\, d\beta^2 \end{aligned}\right\} \quad (4)$$

where $\vec{r}_\alpha^2 = A^2$, $\vec{r}_\beta^2 = B^2$ = Lame coefficient, and $\frac{1}{R_1} = -\frac{\vec{r}_\alpha\,[\vec{r}_{\alpha\alpha}, \vec{r}_\beta]}{A^3B}$ and $\frac{1}{R_2} = -\frac{\vec{r}_\beta\,[\vec{r}_\alpha, \vec{r}_{\beta\beta}]}{AB^3}$ = main curvature radii. The joint introduction of orthogonal

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Surface stresses of isotropic elastic solids

vector units $\frac{\vec{r}_\alpha}{A}$, $\frac{\vec{r}_\beta}{B}$, $\vec{n} = \frac{1}{AB}[\vec{r}_\alpha, \vec{r}]$ which are the basic mobile surface trieder and along which the external force F is

$$\vec{F} = F_1 \frac{\vec{r}_\alpha}{A} + F_2 \frac{\vec{r}_\beta}{B} + F_3 \vec{n} \tag{6}$$

results in the permutation

$$\vec{U} = u \frac{\vec{r}_\alpha}{A} + v \frac{\vec{r}_\beta}{B} + w\vec{n} \tag{7}$$

The surface stress tensor components on the tangent plane are determined by the surface force F

$$\left.\begin{aligned} p_{13} = p_{31} &= F_1 \\ p_{23} = p_{32} &= F_2 \\ p_{33} &= F_3 \end{aligned}\right\} \tag{8}$$

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Limiting expressions for strain components are based on equidistant surfaces

$$\vec{r}^* (\alpha, \beta, z) = \vec{r} (\alpha, \beta) + z\vec{n} \quad (9)$$

where $\vec{r} (\alpha, \beta)$ = mean surface of elastic solids and z = dimensions of the segment along the normal at the point (α, β) and jointly with α, β forming the orthogonal curvilinear system of coordinates. The obtained metric form is

$$d\vec{r}^{*2} = d\vec{r}^2 + 2z (d\vec{r}, d\vec{n}) + z^2 d\vec{n}^2 + dz^2 \quad (10)$$

which, based on Formula (4), results in

$$d\vec{r}^{*2} = A^{*2} d\alpha^2 + B^{*2} d\beta^2 + C^{*2} dz^2 \quad (11)$$

$$(12)$$

where $A^* = A\left(1 - \frac{z}{R_1}\right)$, $B^* = B\left(1 - \frac{z}{R_2}\right)$ and $C^* = 1$

Calculation results of strain tensor components and $(z \to 0)$ provide the expressions

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Surface stresses of isotropic elastic solids

$$\left.\begin{aligned} e_{11} &= \frac{1}{A}\frac{\partial u}{\partial \alpha} + \frac{v}{AB}\frac{\partial A}{\partial \beta} - \frac{W}{R_1} \\ e_{12} &= \frac{A}{B}\frac{\partial}{\partial \beta}\left(\frac{u}{A}\right) + \frac{B}{A}\frac{\partial}{\partial \alpha}\left(\frac{v}{B}\right) \\ e_{22} &= \frac{1}{B}\frac{\partial v}{\partial \beta} + \frac{u}{AB}\frac{\partial B}{\partial \alpha} - \frac{w}{R_2} \\ e_{13} &= \frac{\partial u}{\partial n} + \frac{1}{A}\frac{\partial w}{\partial \alpha} + \frac{u}{R_1} \\ e_{23} &= \frac{\partial v}{\partial n} + \frac{1}{B}\frac{\partial w}{\partial \beta} + \frac{v}{R_2} \\ e_{33} &= \frac{\partial w}{\partial n} \end{aligned}\right\} \qquad (13)$$

where e_{11}, e_{22} and e_{33} = relative expansions (constrictions) and e_{12}, e_{13} and e_{23} = displacements equal to the angle variations between the coordinates: from which

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the volumetric expansion coefficients

$$\operatorname{div} \vec{u} = \frac{1}{AB}\frac{\partial(Bu)}{\partial\alpha} + \frac{1}{AB}\frac{\partial(Av)}{\partial\beta} - \left(\frac{1}{R_1} + \frac{1}{R_2}\right) w + \frac{\partial w}{\partial n} \qquad (14)$$

are derived. The determination of stresses on normal planes is based on formula (1) and expressed by

$$p_{33} = \lambda \operatorname{div} \vec{u} + 2\mu e_{33}$$

resulting with the aid of Formulae (8), (13) and (14) in

$$\left.\begin{aligned} \frac{\partial w}{\partial n} &= \frac{F_3}{\lambda + 2\mu} - \frac{\lambda}{\lambda + 2\mu}\left[\frac{1}{AB}\frac{\partial(Bu)}{\partial\alpha} + \frac{1}{AB}\frac{\partial(Av)}{\partial\beta} - \left(\frac{1}{R_1} + \frac{1}{R_2}\right)w\right] \\ \operatorname{div} \vec{u} &= \frac{F_3}{\lambda + 2\mu} + \frac{2\mu}{\lambda + 2\mu}\left[\frac{1}{AB}\frac{\partial(Bu)}{\partial\alpha} + \frac{1}{AB}\frac{\partial(Av)}{\partial\beta} - \left(\frac{1}{R_1} + \frac{1}{R_2}\right)w\right] \end{aligned}\right\} \qquad (15)$$

By introduction of formula (15) into formula (1)

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Surface stressed of isotropic elastic solids

$$
\left.\begin{aligned}
p_{11} &= \frac{\lambda}{\lambda + 2\mu} F_3 + \frac{2\lambda\mu}{\sigma(\lambda + 2\mu)}\left[\frac{1}{A}\frac{\partial u}{\partial \alpha} + \frac{v}{AB}\frac{\partial A}{\partial \beta} - \frac{w}{R_1} + \sigma\left(\frac{1}{B}\frac{\partial v}{\partial \beta} + \frac{u}{AB}\frac{\partial B}{\partial \alpha} - \frac{w}{R_2}\right)\right] \\
p_{12} &= \left[\frac{A}{B}\frac{\partial}{\partial \beta}\left(\frac{u}{A}\right) + \frac{B}{A}\frac{\partial}{\partial \alpha}\left(\frac{v}{B}\right)\right] \\
p_{22} &= \frac{\lambda}{\lambda + 2\mu} F_3 + \frac{2\lambda\mu}{\sigma(\lambda + 2\mu)}\left[\frac{1}{B}\frac{\partial v}{\partial \beta} + \frac{u}{AB}\frac{\partial B}{\partial \alpha} - \frac{w}{R_2} + \sigma\left(\frac{1}{A}\frac{\partial u}{\partial \alpha} + \frac{v}{AB}\frac{\partial A}{\partial \beta} - \frac{w}{R_1}\right)\right]
\end{aligned}\right\} \quad (16)
$$

on which the Hook's law for surfaces of elastic isotropic solids is based. Examples include a cone and a cylinder of arbitrary configuration. Analogous data are derived for an elipsoid by radius - vector of any point on the surface, linear surface element and the Lame coefficient based on formula (5). In the case of a catenoid and a pseudosphere the linear element is replaced by the first quadratic form, whereas all other points of the computation process remain the same. In his conclusion the author states that the use of formula (16) enables: 1. The computation of surface stresses of elastic solids by measuring the components of the surface displacement vector by available instruments. 2. To establish the limit shell theory. There are 2 figures and 3 Soviet-bloc references.

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ASSOCIATION: Institut mekhaniki Akademii nauk UzSSR (Institute of Mecanics of the Academy of Sciences of the UzSSR)

SUBMITTED: April 7, 1960

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9,3220

S/044/61/000/007/022/055
C111/C222

AUTHOR: Arzhanykh, I.S.

TITLE: On new stability inequalities

PERIODICAL: Referativnyy zhurnal. Matematika, no. 7, 1961, 41, abstract 7 B 176. ("Vses. Mezhvuz. konferentsiya po teorii i metodam rascheta nelineyn elektr. tsepey. no. 7" Tashkent, 1960, 46-54)

TEXT: The author constructs an algorithm which leads to necessary and sufficient conditions (in the form of inequalities) that all roots of the secular equation det (Ax + B) = 0 in the unit circle or after a fractional linear transformation lie in the left halfplane. A comparison with the criterion of Routh-Hurwitz is missing.

[Abstracter's note : Complete translation.]

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VB

ARZHANYKH, I. S.

"On the chain systems of the theory of nonlinear oscillations."

Paper presented at the Intl. Symposium on Nonlinear Vibrations, Kiev, USSR, 9-19 Sep 61

Institute of Mathematics of the Academy of Sciences of the Uzbekian SSR, Tashkent

KABULOV, Vasil Kabulovich, kand. tekhn. nauk; ARZHANYKH, I.S., prof., otv. red.; KISELEVA, V.N., red.; GOR'KOVAYA, Z.P., tekhn. red.

[Integral equations of the equilibrium type and their application to the dynamic design of rods and beams] Integral'nye uravneniia tipa balansa i ikh primenenie k dinamicheskomu raschetu sterzhnei i balok. Tashkent, Izd-vo Akad. nauk Uzbekskoi SSR, 1961. 185 p. (MIRA 15:4)

1. Zamestitel' direktora Instituta matematiki im. V.I.Romanovskogo Akademii nauk Uzbekskoy SSR po Vychislitel'nomu tsentru (for Kabulov). 2. Chlen-korrespondent Akademii nauk Uzbekskoy SSR (for Arzhanykh).(Integral equations) (Strength of materials)

S/166/61/000/002/005/006
B112/B202

AUTHOR: Arzhanykh, I. S., Corresponding Member of the Academy of Sciences, UzSSR

TITLE: Certain sets of differential equations making possible the application of the method of potential integration

PERIODICAL: Izvestiya Akademii nauk UzSSR. Seriya fiziko-matematicheskikh nauk, no. 2, 1961, 52-58

TEXT: The author studies sets of ordinary differential equations to which the integration method of Hamilton and Jacobi can be applied. Thus, he completes a number of studies on sets of differential equations which can be solved by potential methods. First, the author explains why the Hamilton-Jacobi integration method is a potential method: in the Hamilton-Jacobi substitution: $p_\lambda(F) = \partial F/\partial \dot{x}_\lambda = \partial w/\partial x_\lambda$ w appears as potential of the vector $p_\lambda(F)$. The possibility of such a substitution is tantamount to the existence of the following set of equations:

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Certain sets of differential equations...

$\dot{x}_\lambda = \partial H/\partial y_\lambda$, $y_\lambda = \partial w/\partial x_\lambda$, $H = -F + V(F)$, $V(F) = \sum_\lambda \dot{x}_\lambda \partial F/\partial \dot{x}_\lambda$. The following relation $E_\lambda(F) = \partial[H]/\partial x_\lambda$ where $[H]$ denotes the Hamiltonian in which the variables $\dot{x}_\lambda$ are expressed by the variables x_λ, exists between the Euler-Lagrange expression: $E_\lambda(F) \equiv \frac{d}{dt}\frac{\partial F}{\partial \dot{x}_\lambda} - \frac{\partial F}{\partial x_\lambda}$ and the Hamiltonian H. The author considers the following cases: 1) Set $E_\lambda(F) = 0$. It is tantamount to $\partial[H]/\partial x_\lambda = 0$, i.e., $[H] = h = \text{const}$ which can be used to determine the potential w. 2) Set $E_\lambda(F)' + kP_\lambda(F) = 0$, $k = \text{const}$; it leads to the equation: $[H] + kw = h = \text{const}$. for the determination of w. 3) Set:

$$\frac{d}{dt}\left\{E_\lambda(F) + P_\lambda(F)\sum_\mu k_\mu x_\mu\right\} + k_\lambda V(F) = 0,$$

where $k_\lambda = \text{const}$. The equation for the determination of the potential w then reads: $[H] + w\sum_\mu k_\mu x_\mu = \sum_\mu$ [illegible] $+ h$. 4) Set:

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$$\frac{d}{dt}\frac{E_\lambda(F)+UP_\lambda(F)}{\frac{\partial U}{\partial x_\lambda}+mP_\lambda(F)}+V(F)=0,$$

m = const., $U = U(x_1,\ldots,x_n)$ from which it results that $[H] + Uw + \frac{1}{2}mw^2 = 1 = const.$

5) Set:

$$\frac{d}{dt}\frac{1}{\frac{d}{dt}\frac{\partial U}{\partial x_\lambda}}\left\{\frac{d}{dt}\left(E_\lambda(F)+UP_\lambda(F)\right)+\frac{\partial U}{\partial x_\lambda}V(F)\right\}+V(F)=0,$$

for which the equation $[H] + Uw = hU + \sum_\mu l_\mu x_\mu + l$ can be written. There are 3 Soviet-bloc references.

ASSOCIATION: Institut matematiki im. V. I. Romanovskogo AN UzSSR (Institute of Mathematics imeni V. I. Romanovskiy of the Academy of Sciences UzSSR)

SUBMITTED: July 18, 1960

ARZHANYKH, I.S.

Equation of quantum mechanics in the case of geometric coupling. (MIRA 14:8)
Izv. AN Uz.SSR. Ser. fiz.-mat. nauk 3:13-21 '61.

1. Institut matematiki imeni V.I.Romanovskogo AN UzSSR. Chlen-korrespondent AN UzSSR.
(Quantum theory) (Differential equations)

ARZHANYKH, I.S.

High-order kinetic equations of a rank larger than zero. Sbor. nauch.-issl. rab. TTI no.15:17-29 '62. (MIRA 16:9)

S/044/62/000/010/013/042
B180/B186

AUTHOR: Arzhanykh, I. S.

TITLE: Algorithm of the analytical extension of mechanics

PERIODICAL: Referativnyy zhurnal. Matematika, no. 10, 1962, 55-56, abstract 10B253 (Tr. In-ta matem. AN UzSSR, no. 23, 1961, 1-33)

TEXT: The article is devoted to the problem of "whether mechanics has reached its highest state in the qualitative transition from the classical (including the relativistic) to the quantum content ?" The author answers this question in the negative, pointing to the algorithm involved in deriving quantum mechanical equations and as well as integer ranks of hyperquantum mechanical equations. For this purpose the K operator is constructed over the functions

$$\Omega(t, x_1, \ldots, x_n, w)$$

($\Omega \in C^1$ for classical, and $\Omega \in C^2$ for quantum mechanics)

$$K(\Omega) = -TW + W^2 H\left(t, x_1, \ldots, x_n, -\frac{X_1}{W}, \ldots, -\frac{X_n}{W}\right)$$

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Here

$$T = \frac{\partial\Omega}{\partial t}, \quad W = \frac{\partial\Omega}{\partial w}, \quad X_\nu = \frac{\partial\Omega}{\partial x_\nu}.$$

H is the Hamilton function. Then the functional

$$J(\Phi) = \int_{t'}^{t''} dt \int_{w'}^{w''} dw \int_{(D)} \ldots \int K(\Phi)\, dD,$$

is constructed, where (D) is a fixed region of configuration space and $dD = q dx_1 \ldots dx_n$. The algorithm rests upon the fact that, for classical mechanics

$$K(\Omega) = 0, \quad \Omega(t, x_1, \ldots, x_n, w) = 0, \qquad (1)$$

and for quantum

$$\delta J(\Phi) = 0, \quad \Phi = \Psi(t, x_1, \ldots, x_n) \exp\left(\frac{w}{ih}\right). \qquad (2).$$

Taking a Hamiltonian in the form

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$$H = V(t, x_1, \ldots, x_n) + \sum_{\nu} A_{\nu}(t, x_1, \ldots, x_n) P_{\nu} + \frac{1}{2} \sum_{\nu} \sum_{\mu} A_{\nu\mu}(t, x_1, \ldots, x_n) P_{\nu} P_{\mu},$$

the author shows that (1) leads to the Hamilton-Jacobi equation and (2) to the Schrödinger equation, and also that the characteristics of the equation $\delta J(\Phi) = 0$ are solutions to the Hamilton-Jacobi equation. He uses this algorithm to consider relativistic equations of a system of charges, and derives an equivalent system of quantum equations. Using F_1 as the initial operator of the quantum mechanics, and applying its own algorithm, he derives a hyperquantum mechanics of the first rank, the equations of which are the extremal conditions of the functions

$$J_1(\Phi) = \int_{t'}^{t''} dt \int_{w'}^{w''} dw \int_{w_1'}^{w_1''} dw_1 \int_{(D)} \ldots \int K_1(\Phi)\, q\, dx_1, \ldots, dx_n,$$

$$K_1(\Omega) = -F_1(w_1)\, \Omega^3_{w_1}.$$

The same procedure leads to hyper-quantum mechanical equations of different integer ranks. [Abstracter's note: Complete translation.]

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10.6100

S/044/62/000/009/031/069
A060/A000

AUTHORS: Arzhanykh, I. S., Nasretdinov, S. S.

TITLE: The limiting theory of shells

PERIODICAL: Referativnyy zhurnal, Matematika, no. 9, 1962, 61, abstract 9B291 ("Tr. In-ta matem. AN UzSSR", 1961, no. 23, 53 - 64)

TEXT: With the aid of the equation of elastic equilibrium the Lamé strain coefficients are expressed in terms of the displacements, their derivatives, and the external load. Variational equations are derived for the equilibrium and the boundary conditions of the theory of the limiting shell, i.e. of a shell one of whose dimensions tends to zero.

A. N. Tyumanok

[Abstracter's note: Complete translation]

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41453

S/044/62/000/009/028/069
A060/A000

AUTHOR: Arzhanykh, I. S.

TITLE: The solution of the basic problems of dynamics of the mathematical theory of elasticity in the domain of representations by the method of fundamental functions

PERIODICAL: Referativnyy zhurnal, Matematika, no. 9, 1962, 60, abstract 9B285 ("Tr. Tashkentsk. un-ta", 1961, no. 189, 3 - 16)

TEXT: Let the operator L be representable in the form $L = A + \lambda_0 B$. By w_1, w_2, ... and λ_1, λ_2, we shall denote the eigenfunctions and the eigenvalues of the problem

$$(A + \lambda B)\, w = 0.$$

Let us assume, moreover, that the operator A has an inverse, and that the operator B may be represented in the form $B = M\Lambda$, and that there exists an operator C such that

$$(Cw_n, \Lambda w_m) = \delta_{mn}.$$

Under those assumptions it is possible to represent (at least formally) the solu-

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The solution of the...

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A060/A000

tion of the equation Lv = F by the series

$$v = A^{-1} F + \lambda_0 \sum_{n=1}^{\infty} a_n w_n; \quad a_n = \frac{(Cw_n, \Lambda A^{-1} F)}{\lambda_0 - \lambda_n}.$$

These notions are applied in the paper to the formal construction of the solution to the equation

$$\alpha \text{grad div } v - \beta \text{ rot rot } v - (s^2+k^2)v = g$$

under the condition that the vector v(x, y, z) is specified as a function of x, y, z in a bounded region, on the boundary of which homogeneous boundary conditions are satisfied.

V. M. Babich

[Abstracter's note: Complete translation]

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16.9500 (1031, 1121, 1132)

S/103/61/022/004/002/014
B116/B212

AUTHOR: Arzhanykh, I. S. (Tashkent)

TITLE: New inequalities for stability

PERIODICAL: Avtomatika i telemekhanika, v. 22, no. 4, 1961, 436-442

TEXT: New inequalities for stability are brought which are based on Schur's theorem (Ref. 1: M. Kreyn and M. Neymark. "Metod simmetricheskikh i ermitovykh form v teorii otdeleniya korney algebraicheskikh uravneniy" (Method of symmetrical and Hermitian forms applied to the theory of separation of roots in algebraic equations.) Gos. nauchno-tekhnicheskoye izd-vo Ukrainy, Khar'kov, 1936). These inequalities are used to investigate the stability of systems expressed by differential equations which have constant or periodicalcoefficients. The following variational equations with constant or periodical coefficients are written down:

$$\frac{d\xi_s}{dt} = \sum_{r=1}^{n} p_{sr}\xi_r \quad (s = 1, 2, \ldots, n) \qquad (1).$$

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New inequalities ...

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The asymtotic stability is solved with inequalities. These inequalities guarentee the position of the roots of the characteristic equation located in the left semi-plane in the unit circle, respectively. Usually, the criterions for the position of these roots located in the left semi-plane are determined by inequalities of Raus - Hurwitz. But this criterion is not favorable since it makes it necessary to write the equation in an explicit polynominal form. In this paper it is shown that the corresponding inequalities may be obtained without changing the equation into the polynominal form. The inequalities guarenteeing the roots to be within the unit circle are determined, and the small changes are shown, which are necessary to obtain the inequalities for the position of the roots within the left semi-plane. The characteristic equation

$$f(x) \equiv c_0x^n + c_1x^{n-1} + \dots + c_{n-1}x + c_n \equiv$$

$$\equiv [Ax + B] \equiv \begin{vmatrix} a_{11}x + b_{11}, \dots, a_{1n}x + b_{1n} \\ \dots\dots\dots\dots\dots \\ a_{n1}x + b_{n1}, \dots, a_{nn}x + b_{nn} \end{vmatrix} = 0. \quad (2)$$

(2)

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is written. According to Schur's theorem the necessary and sufficient conditions (so that all roots of (2) are located within the unit circle) are that the inequality

$$|c_o| > |c_n| \qquad (3)$$

is fulfilled and also the polynominal

$$f_1(x) \equiv c_o^{(1)} x^{n-1} + \ldots + c_{n-1}^{(1)} \qquad (4)$$

determined by equation

$$x f_1(x) \equiv c_o f(x) - c_n f^*(x) \qquad (5)$$ with

$$f^*(x) = x^n f(1/x) \qquad (6)$$

having the same property. This algorithmic rule is used to find the stability inequalities without representing f(x) in an explicit form. The following theorem is formulated: The conditions that are necessary and sufficient for the roots of the equation (2) to be located within the unit circle are given if the following inequalities are fulfilled:

$$|c_o| > |c_n| \qquad (24)$$

$$|c_o^{(k)}| > |c_{n-k}^{(k)}| \quad (k = 1, 2, \ldots, n - 1) \qquad (25),$$

where the numbers $c_0^{(k)}$ and $c_{n-k}^{(k)}$ are determined by the formulas

$$c_{n-k}^{(k)} = \lim_{x \to 0} f_k(x) = \frac{1}{k!} \left\{ \frac{d^k}{dx^k} ([Ax + B] p_{k-1}(x) - [A + Bx] q_{k-1}(x)) \right\}_{x=0} . \quad (20)$$

and

$$c_0^{(k)} = \lim_{x \to 0} f_k^*(x) = \frac{1}{(k-1)!} \left\{ \frac{d^{k-1}}{dx^{k-1}} ([A + Bx] p_{k-1}^*(x) - [Ax + B] q_{k-1}^*(x)) \right\}_{x=0} \quad (23),$$

respectively, and the polynominals p_i and q_i successively from the formulas

$$p_0 = (a^n),\ q_0 = (b^n) \quad (15)$$ and

$$p_k(x) = c_0^{(k)} p_{k-1}(x) + c_{n-k}^{(k)} x q_{k-1}^*(x),$$
$$q_k(x) = c_0^{(k)} q_{k-1}(x) + c_{n-k}^{(k)} x p_{k-1}^*(x) \quad (17),$$

respectively. If the system of variational equations consists of equations of higher (than first) order it may be reduced to such a system where each equation will be of first order by introducing new unknowns. And, now, the

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S/103/61/022/004/002/014
B116/B212

New inequalities ...

inequalities shown above may be applied. Such a case may be investigated directly by calculating Schur's polynominal in a corresponding manner. There is 1 Soviet-bloc reference.

SUBMITTED: October 25, 1960

Card 5/5

ARZHANYKH, Ivan Semenovich; KABULOV, V.K., otv. red.; SOKOLOVA, A.A., red.; GOR'KOVAYA, Z.P., tekhn.red.

[Canonical equations of a rank higher than zero]Kanonicheskie uravneniia ranga, bol'shego nulia. Tashkent, Izd-vo Akad. nauk Uzbekskoi SSR, 1962. 143 p. (MIRA 16:1)

1. Chlen-korrespondent Akademii nauk Uzbekskoy SSR (for Kabulov).
(Equations)

PHASE I BOOK EXPLOITATION SOV/6137

Arzhanykh, I. S.

Obrashcheniye volnovykh operatorov (Inversion of Wave Operators) Tashkent, Izd-vo AN Uzbekskoy SSR, 1962. 163 p. 1000 copies printed.

Sponsoring Agency: Akademiya nauk Uzbekskoy SSR. Institut matematiki im. V. I. Romanovskogo.

Resp. Ed.: V. K. Kabulov, Corresponding Member Academy of Sciences UzSSR; Ed.: V. N. Kiseleva; Tech. Ed.: Z. P. Gor'kovaya.

PURPOSE: This book is intended for aspirants and scientists working in the fields of theoretical and mathematical physics.

COVERAGE: The author presents the results of investigations of the general equations of classical field theory, discusses their various applications to electrodynamics, mesodynamics, and the mathematical theory of elasticity, and sets up

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integrodifferential equations with time delayed arguments of boundary-value problems associated with wave operators. The problem of wave-operator inversion is studied in its classical formulation. In addition to purely mathematical problems, attention is also given to those physical phenomena which can be reduced to a study of the corresponding operators. No personalities are mentioned. There are 12 references, all Soviet (including 5 translations from the English and German).

TABLE OF CONTENTS:

ARZHANYKH, I.S.

Potentials of quantum mechanics. Izv. AN Uz. SSR. fiz.-mat. nauk 6 no.4:5-11 '62. (MIRA 15:)

1. Institut matematiki imeni V.I.Romanovskogo AN UzSSR.
(Quantum theory)

/

ARZHANYKH, I. S., and GUMEROV, Sh. A.

"Contitions for use of a method of the Hamilton-Jacobi type for integrating equations of motion of nonholonomic conservative systems"

Report presented at the Conference on Applied Stability-of-Motion Theory and Analytical Mechanics, Kazan Aviation Institute, 6-8 December 1962

ARZHANYKH, I.S.; KARIMOV, A.U.

Conditions for the existence of entire integrals, algebraic with respect to velocity, in conservative scleronomous systems. Sbor. nauch.-issl. rab. TTI no.15:163-171 '62. (MIRA 16:9)

ARZHANYKH, I.S.; KARIMOV, A.U. (Tashkent)

"Linear and non-linear integrals of equations of analytical mechanics resulting from the invariance of the kinetic potential in relation to Lie groups"

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 January - 5 February 1964

ARZHANYKH, I. S.

"Canonic equations of a rank greater than zero"

Report presented at the Conference on Applied Stability-of-Motion Theory and Analytical Mechanics, Kazan Aviation Institute, 6-8 December 1962

ARZHANYKH, I.S.

New interpretation of the spectral properties of the hydrogen atom. Izv. AN Uz. SSR. Ser. fiz.-mat. nauk 6 no.5:86 '62. (MIRA 15:11)

1. Institut matematiki imeni V.I. Romanovskogo AN UzSSR.
(Hydrogen—Spectra)

35602
S/166/62/000/001/001/009
B125/B104

3.1400 (2702)
24.4100

AUTHOR: Arzhanykh, I. S., Corresponding Member of the AS Uzbekskaya SSR

TITLE: Stationary boundaries of gravitation clusters

PERIODICAL: Akademiya nauk Uzbekskoy SSR. Izvestiya. Seriya fiziko-matematicheskikh nauk, no. 1, 1962, 5 - 10

TEXT: Three examples are used to show the application of the theory of planet figures considered as gravitational clusters. The application of this theory is much more extended than that of the classical theory of liquid figures (O. Yu. Shmidt, Trudy geofizicheskogo Instituta AN SSSR, 1950, no. 11). The influence of a cluster on one of its particles of mass m is equivalent to the attraction of a distributed mass of density μ and the gravitational potential $U(x, y, z) = f\iiint_T (\mu(\xi, \eta, \zeta)/R)d\xi, d\eta, d\zeta$ (1),

where f denotes the gravitation constant and T the bounding volume of the cluster surface $\sum$ which is sought. $\sum$ is defined as the boundary of all

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Stationary boundaries ... S/166/62/000/001/001/009 B125/B104

possible positions of the cluster particles in form of a potential barrier: $v^2 < 0$ outside Σ, $v^2 = 0$ on Σ, $v^2 > 0$ inside Σ. From the energy integral of the relative motion the following expression is obtained:

$\iiint_T (\mu(\xi, \eta, \zeta)/R) d\xi\, d\eta\, d\zeta + \Omega(x^2 + y^2) = C$ where $\Omega = \omega^2/2f$ to determine Σ at a given μ. $\Omega = \omega^2/2f$ is changed into a more suitable form

$\iint_\Sigma \mu(\vec{n}\,\vec{R}/R) d\Sigma - \iiint_T ((\mathrm{grad}\,\mu, R)/R) dT + 2\Omega(x^2 + y^2) = \mathrm{const}$ (5). If μ is constant the conditions $\Omega < \pi\mu$ for the existence of Σ and $\Omega < (\pi/2)\mu$ for the convexity of Σ follow from $\partial v^2/\partial n < 0$ where n denotes the external normal on Σ. Particular solutions of (5) are for instance Mac Laurin ellipsoids, Jakobi ellipsoid, Lyapunov figures, Poincaré figures etc. At constant density the figures of liquid planets agree with the boundaries Σ of homogeneous clusters. A plane homogeneous cluster, a ring cluster and an inhomogeneous elliptical cluster are studied in detail. In a future paper pulsing configurations will be studied. There are 4 Soviet references.

Card 2/3

Stationary boundaries ...

S/166/62/000/001/001/009
B125/B104

ASSOCIATION: Institut matematiki im. V. I. Romanovskogo AN UzSSR (Institute of Mathematics imeni V. I. Romanovskiy AS Uzbekskaya SSR)

SUBMITTED: July 3, 1961

X

Card 3/3

36923
S/140/62/000/002/001/005
C111/C444

16.4500

AUTHORS: Arzhanykh, I. S., Krivoshein, L. Ye.

TITLE: On the solution of the generalised Cauchy problem for a class of integro-differential equations

PERIODICAL: Vysshiye uchebnyye zavedeniya. Izvestiya. Matematika, no. 2, 1962, 3-12

TEXT: Considered is the generalised Cauchy problem

$$y^{(i)}(x_0) = l_i + \int_a^b \alpha_i(t) P[y]\, dt \quad (i = 0, 1, \ldots, n-1) \tag{1}$$

where

$$\alpha_i(t) P[y] = \alpha_i(t) \sum_0^k b_j(t) y^{(j)}(t) \not\equiv 0 \ (t, x_0 \in [a, b]),$$

for the equation

$$L[y] = f(x) + \lambda \int_a^b \sum_0^m K_i(x, t) y^{(i)}(t)\, dt, \tag{2}$$

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where $L[y] \equiv y^{(n)}(x) + \sum_{1}^{n} a_i(x)\, y^{(n-i)}(x)$. One supposes that either $K_j(x, t) \not\equiv 0$ in $a \leqslant t \leqslant x$, $x \leqslant t \leqslant b$, $j = 0, 1, \ldots, m$, or

$$K_i(x,t) \equiv \begin{cases} E_i(x,t) \not\equiv 0, & a \leqslant t \leqslant x \\ 0, & x \leqslant t \leqslant b \end{cases}$$

the other given functions are regular. The authors use the set-up

$$H_x^{(i)}(x, t)\Big|_{t=x} \equiv \begin{cases} 0; & (0 \leqslant i \leqslant n-2), \\ p(x) \neq 0; & (i = n-1;\ x \in [a, b]) \end{cases} \qquad (3)$$

$$y(x) = \sum_{1}^{n} c_i z_i(x) + \int_{x_0}^{x} H(x, t)\, z(t)\, dt \qquad (4)$$

where $z_i(x)$ is a linearly independent, n-times differentiable system of functions with a Wronski determinant different from zero, $z(x)$ is the

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S/140/62/000/002/001/005
On the solution of the generalised ... C111/C444

new unknown function, and they reduce the problem (1), (2) to the solution of an determination equation which is an integral equation of well-known type; the constants c_i are obtained by substituting (4) into (1).

Numerous subcases are especially discussed: $n \geqslant (m, k)$ or $m=n+p$ $(p \geqslant 1, n \geqslant k)$ or $m > n$, $m \geqslant k$ or $n \geqslant m$, $k-n = s \geqslant 1$, where λ is either eigenvalue of the kernel of the determination equation or not at all. In all cases the determination equations, the form of the solution, and the systems for the determination of the constants c_i are given separately.

The authors mention A. I. Nekrasov. The most important English-language reference reads as follows: I. D. Tamarkine. On Fredholms integral equations, whose kernels are analytic in a parameter. Ann. Math., 28, 2, 1927.

ASSOCIATION: Sredneaziatskiy gosudarstvennyy universitet; Kirgizskiy gosudarstvennyy universitet (Central Asian State University; Kirgisian State University)

SUBMITTED: May 15, 1959

Card 3/3

ALIMOV, A.; ARZHANYKH, I.S.

Some sufficient conditions of stability. Izv.AN Uz.SSR. Ser.tekh.nauk no.4:30-38 '62. (MIRA 15:7)

1. Institut matematiki imeni V.I. Romanovskogo AN UzSSR.
(Stability)

S/058/62/000/012/003/048
A160/A101

AUTHOR: Arzhanykh, I. S.

TITLE: Quantum-transition operators of the mechanics and the field theory

PERIODICAL: Referativnyy zhurnal, Fizika, no. 12, 1962, 25, abstract 12A249 ("Dokl. AN UzSSR", no. 5, 1962, 5 - 9; summary in Uzbek)

TEXT: A new mathematical algorithm of the mechanics and the field theory is proposed. On the basis of the correspondence principle, the new mathematical algorithm, which is fully universal for the quantum mechanics, leads to an investigation of the countable number of the transquantum mechanics of integer ranks, and is also easily applied to the field theory.

[Abstracter's note: Complete translation]

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S/166/62/000/006/001/016
B112/B186

AUTHORS: Arzhanykh, I. S., Krivoshein, L. Ye.

TITLE: Solution of Cauchy's problem for linear integro-differential equations

PERIODICAL: Akademiya nauk Uzbekskoy SSR. Izvestiya. Seriya fiziko-matematicheskikh nauk, no. 6, 1962, 7-16

TEXT: The problem

$$y^{(i)}(x_0) = y_0^{(i)}; \quad (i=0,1,\ldots, \ n-1, \ x_0 \in [a, b]) \tag{1}$$

$$L[y] = f(x) + \lambda \int_a^b \sum_0^m K_i(x, t)\, y^{(m-i)}(t)\, dt, \tag{2}$$

$$L[y] = y^{(n)}(x) + \sum_1^n a_i(x)\, y^{(n-i)}(x) \quad \text{и} \quad K_i(x, t) \not\equiv 0, \ (i=0, 1, \ldots, m),$$

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is transformed into the equation

$$\varphi(x) - \int_{x_0}^{x} M_1(x, t)\varphi(t)\,dt = F(x, \lambda) + \lambda \int_a^b M_2(x, t)\varphi(t)\,dt, \quad (6)$$

or

$$\varphi(x) = F_1(x, \lambda) + \lambda \int_a^b M_3(x, t)\varphi(t)\,dt, \quad (7)$$

by means of a substitution

$$y(x) = \sum_{1}^{n} c_i z_i(x) + \int_{x_0}^{x} H(x, t)\varphi(t)\,dt, \quad (3)$$

wherein H is a given function of the Cauchy type. Eq. (7) is solved by a function of the form

$$\varphi(x) = F_1(x,\lambda) + \lambda\int_a^b R(x,t,\lambda)F_1(t,\lambda)dt.$$

$R(x,t,\lambda)$ denotes the resolvent of the kernel $\tilde{M}_1(x,t)$. The particular case

$$K_l(x, t) = \begin{cases} E_l(x, t) \not\equiv 0, & a < t < x, \\ 0, \; x < t < b, & l = 0,1,\ldots, m, \end{cases} \qquad (21)$$

is investigated separately. The study was made to elucidate aftereffect phenomena occurring in physical and technical processes.

Solution of Cauchy's problem for ... S/166/62/000/006/001/016
B112/B186

ASSOCIATION: Institut matematiki im. V. I. Romanovskogo AN UzSSR (Institute of Mathematics imeni V. I. Romanovskiy AS UzSSR); Institut fiziki, mekhaniki i matematiki AN KirgSSR (Institute of Physics, Mechanics and Mathematics AS KirSSR)

SUBMITTED: February 5, 1962

Card 4/4

FILATOV, Aleksandr Nikolayevich; ARZHANYKH, I.S., otv. red.; MAKAROVA, A., red.; SHAFEYEVA, K.A., red.; GOR'KOVAYA, Z.P., tekhn. red.

[Generalized Lie series and their application] Obobshchennye riady Li i ikh prilozheniia. Tashkent, Izd-vo AN Uzb.SSR, 1963. 105 p. (MIRA 16:7)

(Series)

ARZHANYKH, I.S., otv. red.; SHAFKYEVA, K.A., red.; MAKAROVA, A.A., red.; KARABAYEVA, Kh.U., tekhn. red.

[Studies on differential equations] Issledovaniia po differentsial'nym uravneniiam. Tashkent, Izd-vo AN Uzb.SSR, 1963. 204 p. (MIRA 16:11)

1. Akademiya nauk Uzbekskoy SSR. Tashkent. Institut matematiki. 2. Chlen-korrespondent AN Uzb.SSR (for Arzhanykh). (Differential equations)

ARZHANYKH, I.S.; SAYDAMATOV, M.

Generalization of Lie and Koenigs's theorem to apply to Pfaff's system of equations. Izv. AN Uz. SSR. Ser. fiz.-mat. nauk 7 no.2:5-9 '63. (MIRA 16:6)

1. Institut matematiki imeni V.I.Romanovskogo AN UzSSR.
(Invariants) (Differential equations)

L 19434-63 EWT(d)/EWT(1)/FCC(w)/BDS AFFTC/ASD/IJP(C)
ACCESSION NR: AR3005383 S/C044/63/000/006/B075/B075

SOURCE: RZh. Matematika, Abs. 6B335

AUTHOR: Arzhanykh, I. S.

TITLE: Algorithm of analytic extension of field theory

CITED SOURCE: Tr. In-ta matem. AN UzSSR, vy*p, 26, 1962, 3-12

TOPIC TAGS: variational calculus, analytic extension, field theory

TRANSLATION: The author considers the algorithm of analytic extension of field theory with the classical Lagrangian $\Lambda = \int_{(T)} \mathfrak{L}(t_1, \ldots, t_s, q_1, \ldots, q_n, q_{1,1}, \ldots, q_{n,s})\, dT$,

where t_σ are the coordinates, q_γ are the field potentials, and $q_{\gamma,\sigma} = \frac{\partial q_\gamma}{\partial t_\sigma}$. He studies the case where the Lagrangian has the form

$$\mathfrak{L} = \frac{1}{2} \sum_{\sigma,\rho} \sum_{\nu,\mu} a_{\sigma\rho\nu\mu}(t_\kappa, q_\lambda)\, q_{\nu,\sigma} q_{\mu,\rho} + \sum_{\sigma} \sum_{\nu} a_{\sigma\nu}(t_\kappa, q_\lambda)\, q_{\nu,\sigma} + a(t_\kappa, q_\lambda).$$

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The basis of the algorithm is the Hamilton-Jacobi field theory equation:

$$\sum_{\sigma} \frac{\partial w_{\sigma}}{\partial t_{\sigma}} + H\left(t_{\kappa}, q_{\lambda}, \frac{\partial w_{\kappa}}{\partial q_{\nu}}\right) = 0,$$

where functions w_{σ} are such that

$$\mathfrak{L} = \sum_{\sigma} \frac{\partial (w_{\sigma})}{\partial t_{\sigma}} = \sum_{\sigma} \left\{\frac{\partial w_{\sigma}}{\partial t_{\sigma}} + \sum_{\nu} \frac{\partial w_{\sigma}}{\partial q_{\nu}} q_{\nu,\sigma}\right\}$$

and the Hamiltonian H is given by the equation

$$H = -\mathfrak{L} + \sum_{\sigma} \sum_{\nu} p_{\nu,\sigma} q_{\nu,\sigma}; \quad p_{\nu,\sigma} = \frac{\partial \mathfrak{L}}{\partial q_{\nu,\sigma}}.$$

Determining w_{σ} by the relations

$$\Omega_{\sigma}(t_{\kappa}, q_{\nu}, w_{\kappa}) = 0; \quad w = \frac{\partial (\Omega_{\sigma})}{\partial (w_{\nu})},$$

$$\frac{\partial w_{\nu}}{\partial t_{\kappa}} = \frac{1}{w} \sum_{\sigma} \Delta_{\rho\sigma} \frac{\partial \Omega_{\sigma}}{\partial t_{\kappa}}; \quad \frac{\partial w_{\rho}}{\partial q_{\nu}} = \frac{1}{w} \sum_{\sigma} \Delta_{\rho\sigma} \frac{\partial \Omega_{\sigma}}{\partial q_{\nu}},$$

the author constructs the functional

$$J(\Phi_{\sigma}) = \int K(\Phi_{\sigma})\, dV,$$

$$K(\Omega_{\sigma}) = w \sum_{\rho,\sigma} \Delta_{\rho\sigma} \frac{\partial \Omega_{\sigma}}{\partial t_{\rho}} + w^{2} H\left(t_{\kappa}, q_{\nu}, \frac{1}{w} \sum_{\sigma} \Delta_{\rho\sigma} \frac{\partial \Omega_{\rho}}{\partial q_{\nu}}\right).$$

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ACCESSION NR: AR3005383

for which the Euler equations of the variational problem $\delta J = 0$ are the equations of quantum field theory. The author then employs the developed algorithm to construct trans-quantum field theories. Yu. Pyt'yev.

DATE ACQ: 24Jul63 SUB CODE: MM ENCL: 00

Card 3/3

L 41487-65 EWT(m)/EWP(w) EM
ACCESSION NR: AP4046303 S/0044/64/000/008/B034/B034 7 B

AUTHOR: Arzhany*kh, I. S.

TITLE: Chain systems of the theory of non-linear vibrations 26

SOURCE: Ref. zh. Matematika, Abs. 8B181

CITED SOURCE: Tr. Mezhdunar. simpoziuma po nelineyn. kolebaniyam, 1961. Kiyev, AN USSR, 1963, 59-72

TOPIC TAGS: non linear vibration, chain system, Lagrange equation, chain link kinetic potential, link number, three period system, four period system

TRANSLATION: The author introduces first the concept of the chain-mechanical system, i.e. that system whose Lagrange equations of motion separate into distinct groups (links); the equations of each group are expressed by the kinetic potential corresponding to this group. The sum of all kinetic potentials represent the total kinetic potential of the system. The number of links in the chain system of equations is called "tact" (period) of the system. Besides, the concept of "conditioned tact" of the system is introduced. Examples

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L 41487-65
ACCESSION NR: AP4046303

of chain systems are presented, in particular a vibrational 3-period system. It is also proved, for the case of a nonholonomic system, that its equations of motion in a form containing undetermined factors can be reduced to the 4-period system. The author further applies the chain system to the theory of kinetic equations of the "Order of the larger zero" (or "A" equations, according to the reviewer's terminology) which he developed in a number of other papers.

SUB CODE: MA ENCL: 00

Card 2/2

ARZHANYKH, I.S.; (Tashkent)

"The development of the theory of canonical equations in analytical mechanics"

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 January - 5 February 1964

ARZHANYKH, I.S., otv. red.; KISELEVA, V.N., red.

[Integration of certain differential equations in mathematical physics] Integrirovanie nekotorykh differentsial'nykh uravnenii matematicheskoi fiziki. Tashkent Nauka, 1964. 254 p. (MIRA 17:11)

1. Akademiya nauk Uzbekskoy SSR, Tashkent. Institut matematiki. 2. Chlen-korrespondent AN Uzbekskoy SSR (for Arzhanykh).

L 53706-65 EWT(d)/T/IJP(c)

ACCESSION NR: AP5017169 UR/0166/64/000/005/0005/0011

10
B

AUTHOR: Arshanykh, I. S.

TITLE: Analytic functions of group complexes and some of their applications

SOURCE: AN UzSSR. Izvestiya. Seriya fiziko-matematicheskikh nauk, no. 5, 1964, 5-11

TOPIC TAGS: group theory, analytic function

ABSTRACT: The author discusses group complexes and their analytic functions, defines various types of complexes, and investigates conditions for analyticity. He gives specific examples for the application of analytic functions of group complexes to mechanics and the theory of differential equations. Orig. art. has 34 figures.

ASSOCIATION: Institut matematiki im. V. I. Romanovskogo AN UzSSR (Mathematics Institute, AN UzSSR)

SUBMITTED: 06Jun64 ENCL: 00 SUB CODE: MA

NO REF SOV: 002 OTHER: 000 JPRS

Card 1/1

L 53711-65 EWT(d) Pg-4 IJP(c)

ACCESSION NR: AP5017168 UR/0166/64/000/006/0005/0012

AUTHOR: Arzhanykh, I. S.; Karimov, A. U.

TITLE: Appearance of linear and nonlinear integrals in equations of analytic mechanics in connection with invariability of kinetic potential with respect to Lie groups

SOURCE: AN UzSSR. Izvestiya. Seriya fiziko-matematicheskikh nauk, no. 5, 1964, 5-12

TOPIC TAGS: differential equation, integral calculus, group theory, mechanics

ABSTRACT: The article concerns differential equations and integrals for linear and nonlinear pulses in analytic dynamics. A gradient invariant is found for a nonlinear integral. Orig. art. has 20 formulas.

ASSOCIATION: Institut matematiki im. V. I. Romanovskogo AN UzSSR (Institute of Mathematics, AN UzSSR)

SUBMITTED: 20Jan64 ENCL: 00 SUB CODE: MA, ME

NO REF SOV: 002 OTHER: 000 JPRS

Card 1/1

L 61526-65 EWT(d) IJP(c)

ACCESSION NR: AR5016486 UR/0124/65/000/006/A006/A006

SOURCE: Ref. zh. Mekhanika, Abs. 6A37

12
B

AUTHORS: Arzhanykh, I. S.; Gumerov, Sh. A.

TITLE: On the conditions of partial applicability of the Hamilton-Jacobi type method to integrating the equations of motion for nonholonomic conservative systems

CITED SOURCE: Tr. Mezhvuz. konferentsii po prikl. teorii ustoychivosti dvizheniya i analit. mekhan., 1962. Kazan', 1964, 31-37

TOPIC TAGS: nonholonomic system, motion equation, mechanical system, Hamilton Jacobi method

TRANSLATION: The concept of the potential method of integrating the motion equations of mechanical systems is introduced. The possibilities of applying this method to nonholonomic systems is analyzed. It is determined that the method is not applicable to the general case of nonholonomic systems. V. I. Kirgetov

SUB CODE: MA ENCL: 00

Card 1/1

ARZHANYKH, I.S.; NAZAROV, R.

Solution of the Cauchy problem for Lamé equations with the aid of a biwave equation. Izv. AN Uz. SSR. Ser. fiz.-mat. nauk 8 no.6: 84-85 '64. (MIRA 18:3)

1. Institut matematiki imeni Romanovskogo AN UzSSR.

L 54911-65 EWT(d)/EWT(m)/EWP(w) Pg-4 IJP(c) EM

ACCESSION NR: AR5015064 UR/0044/65/000/005/B040/B040
517.933

25
B

SOURCE: Ref. zh. Matematika, Abs. 5B174

AUTHOR: Arzhanykh, I. S.

TITLE: Canonical equations of rank greater than zero in mechanics and electronics

CITED SOURCE: Sb. nauchno-issled. rabot. Tashkentsk. tekstil'n. in-t. Ser. matem., vyp. 19, 1964, 74-84

TOPIC TAGS: quantum mechanics, differential equation

TRANSLATION: A generalization of a concept from the theory of canonical equations to arbitrary systems containing an even number of differential equations is set forth. The concepts of rank of a canonical system and type of the impulse field are introduced. The proposed generalizations are illustrated with the help of equations of quantum mechanics, equations from the theory of nonlinear oscillations, and also equations of motion of mechanical systems with nonconservative and nonholonomic relations. V. Novoselov

SUB CODE: MA, OP ENCL: 00

Card 1/1

APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000102320005-8"

ARZHANYKH, I.S.

Group complexes with a matrix basis. Izv. AN Uz. SSR. Ser. fiz.-mat. nauk 9 no.2:89 '65. (MIRA 18:6)

1. Institut matematiki imeni Romanovskogo AN UzSSR.

ARZHANYKH, I.S.

Invariant properties of systems of ordinary differential equations ensuring the existence of two integrals. Izv. AN Uz.SSSR. Ser.fiz.-mat.nauk 9 no.3:63 '65. (MIRA 19:1)

1. Institut matematiki imeni V.I.Romanovskogo AN UzSSR. Submitted January 15, 1965.