1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

13

67. **Plane Strain in the Case of Linear Strain Hardening.** A. Yu. Ishlinskii. David W. Taylor Model Basin, U.S. Navy (By Graduate Division of Applied Mathematics, Brown University), Translation RMB-34/24, 1947. 24 pages. From *Prikladnaia Matematika i Mekhanika* (Applied Mathematics and Mechanics), v. 5, 1941, p. 57-70.

A mathematical analysis based on operation of a mechanical model.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS PROCESSES AND PROPERTIES INDEX 3RD AND 4TH ORDERS

4

B

580. **Rolling and Drawing at High Speeds.** A. Yu. Ishlinskii. David W. Taylor Model Basin, U.S. Navy (By Graduate Division of Applied Mathematics, Brown University), Translation RMB-35/9, 1947, 9 pages. From *Prikladnaia Matematika i Mekhanika* (Applied Mathematics and Mechanics), v. 7, 1943, p. 226-230.

Presents a scheme for approximate determination of the forces encountered in rolling or drawing, taking account of the friction at the rolls or die and of the effect of the strain rate on the state of stress. Shows that, by a few simplifying assumptions, the problem can be reduced to the solving of one ordinary differential equation of the first order in the case of drawing, and 2 such equations in the case of rolling.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

ISHLINSKII, A. IU.

RT-1079 (Stability of visco-plastic flow of a circular slab) Ob ustoichivosti viazkoplasticheskogo techeniia krugloi plastiny.
Prikladnaia Matematika i Mekhanika, 7(6): 405-412, 1943.

Ishlinskiy, A. Yu

ISHLINSKIY, A. YU.

Osesimmetricheskaia zadacha plastichnosti i proba Brinellia. (Prikladnaia matematika i mekhanika, 1944, v. 8, no. 3, p. 201-224, tables, diagrs., bibliography)

Summary in English.

Title tr.: The problem of plasticity with axial symmetry and Brinell's test.

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955.

ISHLINSKIY, A. YU.

USSR.

"Some Applications of Statistics in Describing the Principles of Deformation in Bodies"
Iz. Ak. Nauk. SSSR. Otdel. Tekh. Nauk.
No. 9. 1944.

BR-52059019

Ishlinskiy, A. Yu

ISHLINSKII, A. IU.

Uravneniia deformirovaniia ne vpolne uprugikh i viazkoplastieheskikh tel. (Akademiia Nauk SSSR. Izvestiia. Otdelenie tekhnicheskikh nauk, 1945, no. 1-2, p. 34-45, diagr., bibliography)

Title tr.: Equations of deformation of not completely elastic and visco-plastic solids.

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955.

L 23313-66 EWT(1) IJP(c)

ACC NR: AP6007576 SOURCE CODE: UR/0040/66/030/001/0030/0041

AUTHORS: Ishlinskiy, A. Yu. (Moscow); Temchenko, M. Ye. (Kiev)

ORG: none

TITLE: Rotation stability of a rigid body on a string having an ellipsoidal cavity completely filled with an ideal incompressible fluid

SOURCE: Prikladnaya matematika, i mekhanika, v. 30, no. 1, 1966, 30-41

TOPIC TAGS: dynamic system, rotation, mechanics, motion mechanics

ABSTRACT: The method previously described by the authors (O malykh kolebaniyakh vertikal'noy osi volchka imeyushchego polost', tselikom napolnennuyu ideal'noy neszhimayemoy zhidkost'yu. PMTF, 1960, No. 3) is extended to consider the rotation stability of a rigid body on a string having an ellipsoidal cavity completely filled with an ideal incompressible fluid. The perturbed differential equations of motion are derived for the rigid body (using Lagrange methods), for the fluid motion in the cavity, and for the interaction forces between the fluid and the rigid body. After considerable manipulation, the equation of motion of the body is derived, a solution is assumed, and a characteristic equation is formulated. The behavior of the roots of this equation and their effects on stability of motion are discussed for some limiting cases and for a general case. Orig. art. has: 5 figures and 54 formulas.

SUB CODE: 20, 13/ SUBM DATE: 29Jun65/ ORIG REF: 008

Card 1/1

ISHLINSKIY, A.

USSR/Aeronautics Sep 1946
Rockets - Stabilization
Ballistics, Rocket - Interior

"Two Notes on the Theory of Rocket Motion," A Ishlinskiy, 2 pp

"Comptes Rendus (Doklady)" Vol LIII, No 7

The article gives two possible differential equations descriptive of a rocket in flight, one stressing the changing velocity and the other stressing the varying mass of the rocket. The second one proposed by the author facilitates the solution, by means of the calculus of variations, of the extremal problem relating to the maximum distance of rectilinear flight s.

21T5

ISHLINSKIY, A. Yu.

USSR/Engineering
Elasticity - Stability
Mathematics, Applied

Feb 49

"Dynamic Forms of Loss of Stability in Elastic Systems," Acad M. A. Lavrent'yev, A. Yu. Ishlinskiy, 4 pp

"Dok Ak Nauk SSSR" Vol LXIV, No 6

With sudden application of load exceeding first critical value to an elastic system, a motion arises, and, as result of this motion, system does not return to its original state. Considers normal motion, in which transposition of all elements in the system is proportional to the same function of time. Gives mathematical analysis of this motion for an iron bar and a pipe. Submitted 24 Dec 48.

PA 29/49T22

A

(2)

3000

Išlins'kil, O. Yu. On the transformation of a double curvilinear into a double surface integral. Dopovidi Akad. Nauk Ukrain. RSR 1951, 397-400 (1951). (Ukrainian. Russian summary)

Elementary transformation, based on Stokes' theorem, of the repeated curvilinear integral of $ds\,ds'/R$ where R is the distance in 3-space. L. C. Young (Madison, Wis.).

10-28-54 LL

DALETS'KYY, Yu.L.; ISHLINS'KYY, A.Yu., diysnyy chlen.

Evaluation of the residual member in Taylor's formula for functions of Hermitian operators. Dop.AN URSR no.4:234-238 '51. (MLRA 6:9)

1. Akademiya nauk Ukrayins'koyi RSR (for Ishlins'kyy). 2. Instytut matematyky Akademiyi nauk Ukrayins'koyi RSR (for Dalets'kyy). (Series, Taylor's)

TEMCHENKO, M.Ye.; ISHLINS'KYY, O. Yu., diysnyy chlen.

Laminar frictional action in viscous and elastic liquids. Dop.AN URSR no.3: 180-185 '52. (MLRA 6:9)

1. Akademiya nauk Ukrayins'koyi RSR (for Ishlins'kyy). 2. Instytut matematyky Akademiyi nauk Ukrayins'koyi RSR (for Temchenko). (Viscosity)

PANCHYSHYN, V.H.; ISHLINS'KYY, A.Yu., akademik.

Automatic electric piezometer. Dop.AN URSR no.4:348-350 '52. (MLRA 6:10)

1. Akademiya nauk Ukrayins'koyi RSR (for Ishlins'kyy). 2. Instytut matematyky Akademiyi nauk Ukrayins'koyi RSR (for Panchyshyn). (Piezometer)

ISHLINSKIY, A.Yu.

"A New Device for Measuring the Angular Velocity of a Moving Object," Report submitted at the Second All-Union Confe:ence on Automatic Control Theory, Moscow, 1953

Sum 1467

SHAMANS'KYY, V.Ye.; ISHLINS'KYY, A.Yu., diysnyy chlen.

Conformal representations of adjacent fields with stationary points on the boundary, in the theory of filtration. Dop.AN URSR no.3:158-162 '53. (MLRA 6:6)

1. Instytut matematyky AN URSR (for Shamans'kyy). 2. Akademiya nauk Ukrayins'koyi RSR (for Ishlins'kyy). (Surfaces, Representation of) (Filters and filtration)

KRYZHANOVS'KIY, O.M.; ISHLINS'KYY, A.Yu., diysnyy chlen.
[redacted]

Calculation of integral criteria for the optimum of regulation processes. Dop.AN RSR no.3:183-192 '53. (MLRA 6:6)

1. Instytut hirnychoyi spravy im. M.M.Fedorova, Akademiya nauk Ukrayins'koyi RSR (for Kryzhanovs'kyy). 2. Akademiya nauk Ukrayins'koyi RSR (for Ishlins'kyy). (Servomechanisms) (Differential equations, Linear)

KRYZHANOVS'KYY, O.M.; ISHLINS'KYY, A.Yu., diysnyy chlen.

Approximation method for the study of intermittent regulatory systems in cutters and coal combines with ratchetconveyance. Dop.AN URSR no.3:191-195 '53. (MLRA 6:6)

1. Instytut hirnychoyi spravy im. M.M.Fedorova AN URSR (for Kryzhanovs'kyy).
2. Akademiya nauk Ukrayins'koyi RSR (for Ishlins'kyy). (Servomechanisms) (Coal-mining machinery)

KRYZHANOVS'KYY, O.M.; ISHLINS'KYY, A.Yu., diysnyy chlen.

Quadratic criteria of the character of transitional regulation processes defined by linear difference equations with constant coefficients. Dop. AN URSR no.3:196-202 '53. (MLRA 6:6)

1. Instytut hirnychoyi spravy im. M.M. Fedorova AN URSR. 2. Akademiya nauk Ukrayins'koyi RSR (for Ishlins'kyy). (Difference equations) (Servomechanisms)

KRYZHANOVS'KYI, O.M.; ISHLINS'KYI, O.Yu., diisnyi chlen Akademiyi nauk URSR.

Investigation of intermittent control systems of cutting machines and coal cutter-loaders with feeding section pulsators and fixed-speed servomotors. Dop.AN URSR no.4:270-275 '53. (MLRA 6:8)

1. Instytut hirnichoyi spravy im.M.M.Fedorova Akdemiyi nauk URSR. 2. Akademiya nauk URSR (for Ishlins'kyi). (Coal-mining machinery)

ANISIMOVA, V.B.; ISHLINS'KYI, O.Yu., diisnyi chlen Akademiyi nauk URSR.

Rigidity of the compressed elements of cylindrical shells. Dop.AN URSR no.4:281-284 '53. (MLRA 6:8)

1. Kyyivs'kyi derzhavnyi universytet im. T.G.Shevchenka. 2. Akademiya nauk URSR (for Ishlins'kyi). (Elastic plates and shells)

TVERITIN, O.M.; ISHLINS'KYY, O.Yu., diysnyy chlen.

Mathematical consideration of the problem of laternal impact on an elastic-tensile rod with free ends. Dop.AN URSR no.5:307-312 '53. (MLRA 6:10)

1. Akademiya nauk Ukrayins'koyi RSR (for Ishlins'kyy). 2. Dnipropetrovs'kyy instytut inzheneriv zaliznichnoho transportu im. L.M.Kaganovycha (for Tveritin).
(Mathematical physics) (Elastic rods and wires)

FIL'CHAKOV, P.F.; ISHLINS'KYY, O.Yu., diysnyy chlen.

On the problem of determining the Christoffel-Schwarts constant in hydromechanical calculations for double-pile cofferdams. Dop.AN URSR no.5:317-322 '53. (MLRA 6:10)

1. Akademiya nauk Ukrayins'koyi RSR (for Ishlins'kyy). 2. Instytut matematyky Akademiyi nauk Ukrayins'koyi RSR (for Fil'chakov). (Cofferdams)

TEMCHENKO, M.Ye.; YUSHCHENKO, O.A.; ISHLINS'KYY, O.Yu., diysnyy chlen.

Stresses in a binding layer (glue, welds, fretwork). Dop.AN URSR no.5:365-369 '53. (MLRA 6:10)

1. Akademiya nauk Ukrayins'koyi RSR (for Ishlins'kyy). 2. Instytut matematyky Akademiyi nauk Ukrayins'koyi RSR (for Temchenko and Yushchenko).

(Strains and stresses)

Il'inskii, A. Yu. On an integro-differential relation in the theory of an elastic cord (cable) of variable length. Ukrain. Mat. Žurnal 5, 370–374 (1953). (Russian)

Elasticity (Math)

The upper end of an elastic cable is attached to a drum, which is forced to rotate, and its lower end supports a heavy mass, m. The displacement of a cross-section of the cable is assumed to be of the form $u(x, t) = x\phi(t)$, and an approximate equation for $\phi(t)$ is found, essentially by Rayleigh's method. To illustrate the degree of approximation, if the cylinder is held fixed, the resulting equation leads to the familiar correction wherein one-third the spring mass is added to the spring-supported mass to find the effective mass.

R. E. Gaskell (Seattle, Wash.).

ISHLINSKIY A.Yu.

LYAPUNOV, A.M.; SRETENSKIY, L.N., otvetstvennyy redaktor; KOLMOGOROV, A.N., akademik; SMIRNOV, V.I., akademik; SUBBOTIN, M.F.; ISHLINSKIY, A.Yu.; MIGIRENKO, G.S., kandidat fisicheskikh-matematicheskikh nauk; PETRO-VICH, V.V., kandidat fisicheskikh-matematicheskikh nauk; GERMOGENOV, A.V., redaktor; ALEKSEYEVA, T.V., tekhnicheskiy redaktor.

[Collected works] Sobranie sochinenii. Moskva, Izd-vo Akademii nauk SSSR. Vol. 1. 1954. 446 p. (MLRA 7:11)

1. Chlen-korrespondent Akademii nauk SSSR (for Sretenskiy and Subbotin) 2. Deystvitel'nyy chlen Akademii nauk SSSR (for Ishlinskiy) (Liapunov, Aleksandr Mikhailovich, 1857-1918) (Mathematics)

ISHLINSKIY, A-Yu. ISHLINSKIY, A-Yu.

Išlinskiĭ, A. Yu. Consideration of questions on stability of equilibrium of elastic bodies from the point of view of the mathematical theory of elasticity. Ukrain. Mat. Ž. 6, 140–146 (1954). (Russian) MS 1 - F/W

An infinite plane strip of breadth $2h$ is subjected to end thrusts acting as distributed pressure and the deformations assumed to remain plane. The ordinary equations of plane elastic equilibrium and the boundary conditions are applied to determine the critical pressure at which instability sets in, in terms of the parameter $\pi h/l$, where $2l$ is the perturbation wave-length for the assumed sinusoidal form of the previously straight edges. This allows comparison with the Euler formula derived by the methods of "strength of materials". Thus for $l/2h=10\pi$ the ratio of the critical pressure to that derived from the Euler formula is 1.000024. The method of procedure is quite general.

L. M. Milne-Thomson (Greenwich).

ISHLINSKIY, A.Yu.

General theory of plasticity with linear reinforcing. Ukr. mat.zhur. 6 no.3:314-325 '54. (MIRA 8:5)
(Plasticity)

ISHLINSKIY, A.Yu.

Plane flow of sand. Ukr. mat. zhur. 6 no.4:430-441 '54. (MIRA 8:5)
(Sand) (Statics)

ISHLINSKIY, A. Yu.

USSR.

1628. Ishlinskii, A. Yu., On a limiting process in the theory of stability of elastic rectangular plates (in Russian), *Doklady Akad. Nauk SSSR* (*N.S.*) 95, 3, 477-479, Mar. 1964.

Note contains a rigorous justification of a surprising result obtained by the author in 1945 (no reference). It concerns the problem of stability of a rectangular plate under uniformly distributed compressive loading acting on two opposite hinged edges, the two other edges (parallel to the loading) being free. In the limiting case of a very long plate, the buckling load is calculated to be, contrary to expectation, smaller than the one for a cylindrical form of loss of stability. A mathematical analysis reveals the reason for this behavior and the result is made physically plausible by stating that Saint Venant's principle is not applicable to plates under tension.

G. Herrmann, USA

ISHLINSKIY, A.Yu.; ZVOLINSKIY, N.V.; STEPANENKO, I.Z.

Theory of elasticity. Dokl.AN SSSR 95 no.4:729-731 Ap '54.
(MLRA 7:3)

1. Deystvitel'nyy chlen Akademii nauk USSR (for Ishlinskiy).
(Soil mechanics) (Blasting)

ISHLINSKIY, A.Yu.

Equation for longitudinal motions of elastic fiber ropes of varying length. Dokl.AN SSSR 95 no.5:939-941 Ap'54. (MLRA 7:4)
(Rope) (Integral equations)

USSR/Physics

Card : 1/1

Authors : Ishlinskiy, A. Yu., Act. Memb. of Ukr-Acad. of Sciences

Title : Focusing of electrified particles

Periodical : Dokl. AN SSSR, 96, Ed. 4, 721 - 724, June 1954

Abstract : Derivation of the law (formula) by which an electrified particle moving in an electric or magnetic field with a constant speed can be focused at a desired point (e. g. $\frac{1}{\rho} = \frac{eH}{mcv}$,

where e - charge of the particle, m - mass of the particle, v - velocity of the particle, c - light velocity, and H - intensity of magnetic field which is a function of x), i. e. $H(x) = \frac{\pi^2 mcx}{el^2}\left(x - \frac{\pi^2 x^3}{2l^2} + \frac{9\pi^4 x^5}{40l^4} - \dots\right)$.

Two references. Graph.

Institution : Acad. of 1Sc. Ukr-SSR, Institute of Mathematics

Submitted : March 8, 1954

[illegible] set of equations ob-tained from (1) by substituting continuous functions X_k^* for X_k, which coincide with X_k everywhere except a narrow region around the discontinuity. An example to this, given by the eqations,

$$dx/d\tau = x + y - m(x);\ dy/d\tau = -x - y,$$

describing a gyroscopic system, is discussed in detail. Here $m(x) = -m$ for $x < 0$, and $m(x) = m$ for $x > 0$; a continuous function $m^*(x) = -m$ for $x < \varepsilon$; $m^*(x) = m$ for $x > \varepsilon$; and $m^*(x) = mx/\varepsilon$ for $-\varepsilon \leq x \leq \varepsilon$, where ε positive.

S. Kulik (Columbia, S.C.)

USSR/Physics - Plasticity

FD-3091

Card 1/1 Pub. 85 - 6/16

Author : Zvolinskiy, N. V.; Ishlinskiy, A. Yu.; Stepanenko, I. Z.

Title : Remarks on S. S. Grigoryan's article "Stating of dynamic problems for ideal plastic media"

Periodical : Prikl. mat. i mekh., 19, Nov-Dec 1955, 733

Abstract : The present authors remark that S. S. Grigoryan carried out interesting investigations of the equation of state of plastic medium, which equation was proposed by them ("Dynamics of ground masses," DAN SSSR, 95, No 4, 1954), and his results deserve attention. Grigoryan pointed out that the energy condition on the surface of strong discontinuity is fulfilled during the entire time of the process only if in the external region the pressure equals the critical pressure, as was assumed in the authors' work, and he also made a conclusion concerning the impossibility of the existence of a certain zone III etc. As a result Grigoryan concludes categorically that the stated problem cannot be solved by means of the authors' equation of state. The present authors cannot agree with the categorical character of this conclusion. The authors consider their scheme as a limiting scheme and not as completely solving the problem of deformation of densification of grounds. The entire problem consists in whether their description gives the main outlines of the phenomenon of dynamic densification of grounds. The problem remains open.

Submitted :

ISHLINSKIY, A.Yu.

Poshekhonov's pendulum. Astron.zhur.32 no.5:462-468 S-O '55.
(MLRA 9:1)

1.Institut matematiki Akademii nauk SSSR.
(Pendulum)

ISHLINSKIY, A.Yu.

Theory of a servomechanism system. Prykl. mekh. 2 no.1: 3-4 '56.

(MLRA 10:2)

1. Institut matematiki Akademii nauk URSR.
(Automatic control) (Servomechanisms)

ISHLINSKIY, A.Yu., akademik.

Electric modeling of channel stream flow. Dop. UN URSR no.2:124-126 '56. (MLRA 9:12)

1. Akademiya nauk URSR. 2. Institut matematiki Akademii nauk URSR. (Hydraulics) (Electromechanical analogies)

ISHLINSKIY, A. Yu.

[illegible] approximate method of investigation of [illegible]

[illegible]

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618830005-0"

SOV/124-57-9-9823

Translation from: Referativnyy zhurnal, Mekhanika, 1957, Nr 9, p 1 (USSR)

AUTHOR: Ishlinskiy [Ishlins'kyy, A. Yu.]

TITLE: Mutual Contacts Between Russian and Ukrainian Scientists in the Field of Mathematics and Mechanics (Vzaimosvyazi russkikh i ukrainskikh uchenykh v oblasti matematiki i mekhaniki) in Ukrainian

PERIODICAL: Narysy z istoriyi tekhn. AN UkrRSR, 1956, Nr 3, pp 3-10

ABSTRACT: Bibliographic entry

Card 1/1

ISHLINS'KIY, A.Yu.

Relay-type correction for determining gyro-horizon errors on rolling ships. Avtomatyka no.3:1-13 '56. (MLRA 9:11)

1. Institut matematiki Akademii nauk URSR.
(Stability of ships) (Gyroscope)

ISHLINSKIY, A. Yu.

"On the Precession Oscillations of a Loaded Single-Axis Gyroscopic Stabilizer," by A. Yu. Ishlinskiy (O. Yu. Ishlins'kiy), Institute of Mathematics, Academy of Sciences Ukrainian SSR, Avtomatika, No 4, 1956, pp 1-5

The housings of single-axes gyroscopic stabilizers loaded with a constant moment effect a nondamping oscillation about the axis of precession only if the control of the stabilized engine is by means of a contact device. The frequency of these oscillations, as shown in practice, is considerably less than the frequency of nutation, thus permitting the use of precession (elementary) gyroscopic theory in their study.

Sum 1274

ISHLINS'KIY, A.Yu., kerivnik seminaru, akademik

Working plan of the seminar on the theory and techniques of automatic control at the Academy of Sciences of the Ukrainian SSR for 1957. Avtomatyka no.4:99 '56. (MLRA 10:2)

1. AN URSR.
(Automatic control)

ISHLINSKIY, A.Yu., (Moskva)

Slippage in the contact zone in rolling friction. Izv. AN SSSR. Otd. tekh. nauk no.6:3-15 Je '56. (MLRA 9:9)

(Friction)

TSHLINSKIY, A. Yu.

Ilinskii, A. Yu. On the theory of the horizontal gyro-compass. Prikl. Mat. Meh. 20 (1956), 487-499. (Russian)

1-F/W

[illegible]

... theorems are established. They represent ... of the forced vibrations of the gyro-frame ... small vibrations and supposing that

$$F - mv^2/R \approx F \approx mg,$$

neglecting the friction forces, one obtains a system of four ... linear differential equations with constant coefficients; this is different from the approximation ... [J. W. Geckeler ... 1935; R. Grammel, Der Kreisel, 2. Band]. The roots of the characteristic equation ... is the frequency of the ... (Belgrade)

[A-]

ISHLINS'KIY, [O]Yu. (Kiiv)

Shock absorption at highly accelerated motion [with summaries in Russian and English]. Prykl.mekh. 3 no.2:131-139 '57. (MLRA 10:9)

1. Institut matematiki Akademii nauk URSR.
(Shock absorbers)

ISHLINS'KIY, A. Yu.

ISHLINS'KIY, A.Yu. (Kiyv)

Curving of a box frame fixed at four points. Prykl.mekh.3 no.3:336-339 '57. [In Ukrainian with summary in Russian] (MIRA 10:12)

1. Institut matematiki AN URSR.
(Deformations (Mechanics))

ISHLINSKIY, A. YU.

Teoriia Dvukhgiroskopicheskoi ... [illegible]
... A. Iu. Ishlinskii ... [illegible]
... Apr 1957 pp ... [illegible]
... [illegible]
... girosk... vertikali

ISHLINSKIY, A.YU.

"Reference Data on Deformation of Elements in a Cardan Suspension," by A. Yu. Ishlinskiy, Institute of Mathematics, Academy of Sciences Ukrainian SSR, Prikladna Matematika, No 1, 1957, pp 103-108

The brief item presents reference data (diagrams and formulas) on the deformation of cardan suspension elements, i. e., rings and yokes, under different loading conditions by concentrated forces and moments. (U)

SUM.1360

ISHLINSKIY, A. Yu. [Ishlins'kyi, O. IU.], akademik

Outstanding mathematician and mechanician. Nauka i zhyttia 7 no.6:35-36 Je '57. (MIRA 12:10)

1. AN USSR. (Liapunov, Mikhail Vasil'evich, 1857-1918)

ISHLINSKIY, A.Yu.; PARASYUK, O.S.; SHEVELO, V.N.

Gurii Nikolaevich Savin; on the occasion of his 50th birthday.
Ukr.mat.zhur. 9 no.2:225-229 '57. (MLRA 10:7)
(Savin, Gurii Nikolaevich, 1907-)

ISHLINSKIY, A. YU.

PA - 2201

AUTHOR ISHLINSKIY, A.JU.

TITLE On the Theory of the Gyroscopic Pendulum (K teorii giroskopicheskogo mayatnika).

PERIODICAL Prikladnaia Matematika i Mekhanika, 1957, Vol 21, Nr 1, pp 3-14 (U.S.S.R.)
Received 3/1957 Reviewed 4/1957

ABSTRACT Within the framework of the theory of precession of gyroscopes the author gives a preliminary derivation of the general equations of the motion of the axis of the gyroscope. The rotor of the gyroscope is suspended on gimbals. The angles of rotation occurring here are shown. The kinetic moments of the rings of gimbal suspension can be neglected with regards to their motion relatively to the original system of equations. The equations resulting herefrom are written down. Next, the author attends to the equations of motion of the rotor of the gyroscope. Here it is assumed that there exist no forces of friction in the axes of the gimbal suspension. Besides, it is assumed that no forces of interaction exist. The form of the system of equations given here is to be conserved for any xyz coordinate systems if the origin is located in the center of the gimbal suspension and if the z-axis is identical with the z'-axis of the system of coordinates x'y'z'. The x'y'z' system is rigidly connected with the inner ring of the suspension.
The author now deals with the main problem, e.g. the investigation of the behavior of a gyroscopic pendulum the suspension point of which is shifted in any way on the surface of the earth. For this purpose also a DARBOUX tetrahedron is introduced, the vertex of which is in the center

Card 1/2

ISHLINSKIY, A. Yu.

40-21-2-4/22

AUTHOR: Ishlinskiy, A.Yu. (Moscow)

TITLE: The Theory of the Two-Gyroscope-Vertical (Teoriya dvukh-giroskopicheskoy vertikali)

PERIODICAL: Prikladnaya Matematika i Mekhanika, 1957, Vol 21, Nr 2, pp 175-183 (USSR)

ABSTRACT: In several papers the author has treated the elementary theory of several systems of gyroscopes [Ref 1,2] . The system considered in the present paper (denoted as two-gyroscope-vertical) is distinguished from the spatial gyro-compass of his first paper only by another situation of the center of mass of the gyroscope frame. By another orientation of the gyroscopes the author means to obtain from this system a more exact information of the local vertical. Furthermore with this system the degree of latitude can be determined theoretically. For the practical possibilities of application the author's considerations, however, are insufficient, since the friction and all other possible disturbances are neglected by the author. There are 3 Soviet references.

SUBMITTED: November 20, 1956
AVAILABLE: Library of Congress
Card 1/1

1. Gyroscopes--Theory

ISHLINSKIY, A. Yu.

40-21-6-1/18

AUTHOR: Ishlinskiy, A.Yu. (Moscow)

TITLE: On the Equations of the Position-Finding Problem of a Moving Object With the Aid of Gyroscopes and Accelerometers (Ob uravneniyakh zadachi opredeleniya mestopolozheniya dvizhushchegosya ob"yekta posredstvom giroskopov i izmeriteley uskoreniy)

PERIODICAL: Prikladnaya Matematika i Mekhanika, 1957, Vol 21, Nr 6, pp 725-739 (USSR)

ABSTRACT: After an indication to the essentially increased exactnesses which could be obtained with modern gyroscopic instruments, the author shows that now the problem of localization without referring to external resources has come nearer to practical realization. After some general considerations on the problem of inertia navigation one of the possible arrangements is investigated in detail and a theory for this is established. The author's system consists of gyroscopes and accelerometers and represents only one of the discussed variants for the inertia navigation. The structure elements of the system are considered to be perfect so that the most interesting part of the problem - the question of exactness - is not investigated. The results of the paper are well-known to a large ex-

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tent or can be deduced from well-known results in a simple way. There are 8 figures and 7 references, 4 of which are Soviet, 2 American, and 1 German.

SUBMITTED: May 20, 1957

AVAILABLE: Library of Congress

1. Inertial navigation systems-Mathematical analysis 2. Gyroscopes-Applications 3. Accelerometers-Applications

ISHLINSKIY, A. Yu.

AUTHOR: Ishlinskiy, A. Yu., Member of the AN Ukrainian SSR 20-1-11/42

TITLE: The Example of a Bifurcation Which Does not Lead to the Occurrence of Unstable Forms of the Steady Motion (Primer b ;urkatsii, ne privodyashchey k poyavleniyu neustoychivykh form statsionarnogo dvizheniya)

PERIODICAL: Doklady AN SSSR, 1957, Vol 117, Nr 1, pp. 47-49 (USSR)

ABSTRACT: Generally the existence of one or several forms of the equilibrium or the steady motion of a mechanical system depends on the concrete value of a certain parameter which essentially determines the condition of the system. A single form (principal form) of the equilibrium of the steady motion can correspond to a certain interval of the parameter. As example formulae for the motions of a straight-lined pillar (stoyka) of Euler (Eyler) and of a pendulum are quoted here. Also other forms, together with the fundamental form of the equilibrium or the steady motion, can correspond to other intervals of the main parameter. The values at the limit of the existence of one or more formulae are denoted as bifurcation values. In some cases, especially the above mentioned cases, new forms of the equilibrium of the steady motion develop from the fundamental form. A slight deviation of the new forms from the original form here corresponds

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The Example of a Bifurcation Which Does not Lead to the Occurrence of Unstable Forms of the Steady Motion. 20-1-11/42

the stability of the fundamental form, however, not being lost here. The equations for the determination of the bifurcation values of the angular velocity are written down and their solution is briefly discussed. There are 4 figures and 3 Slavic references.

ASSOCIATION: Institute for Mathematicsof the AN USSR (Institut matematiki Akademii nauk SSSR)

SUBMITTED: May 17, 1957

AVAILABLE: Library of Congress

Card 3/3

ISHLINSKIY, A. YU. (Moscow State University)

"Concerning the Autonomous Determination of the Position of a Moving Object by Means of a Spatial Gyrocompass, a Directional Gyro, and an Integrating Device."

paper presented at the Second Scientific and Technical Intervus Conference on Problems of Contemporary Gyroscopy, Ye. F. Otvagin, Secretary of the Organization Committee; Leningrad, Izvestiya Uchebnykh Zavedeniy, Priborostroyeniye, No. 5, Sep/Oct 1958, pp 161-163

The Second Intervus Conference on Problems of Contemporary Gyroscopy Technique, convoked by decision of the Ministry of Education USSR, took place in the Leningrad Institute of Precision Mechanics and Optics from 24 to 27 November 1958.

21-1-3/26

AUTHOR: Ishlinskiy, A.Yu. (Ishlins'kyy, O.Yu.), Academician of the Ukrainian Academy of Sciences

TITLE: Extension of an Infinitely Long Ideally Plastic Bar of Variable Cross-Section (Rastyazheniye beskonechno dlinnoy ideal'no plasticheskoy polosy peremennogo secheniya)

PERIODICAL: Dopovidi Akademii Nauk Ukrains'koi RSR, 1958, # 1, pp 12-16 (USSR)

ABSTRACT: The article represents a theoretical investigation of the problem of infinitely long bar extension. On extending a bar of variable cross-section beyond the limit of elasticity, there are regions in the bar where deformations remain within the limits of elasticity. The bar material is supposed to be ideally plastic.

In the present article, it is shown that with a special shape of the bar boundary, a "continuous" plastic state is nevertheless possible. The bar boundary should in this case take the form of a periodic curve lacking even harmonics. The length of the boundary period should be twice that of the average width of the bar, while the range of fluctuation of the width should be infinitely small. The bar boundary

21-1-3/26

Extension of an Infinitely Long Ideally Plastic Bar of Variable Cross-Section

should be sufficiently smooth. Otherwise, the series expressing the solution will be divergent, which indicates the presence of elastic zones in the bar which have not reached the limit of elasticity.

The article contains 4 figures and 2 Russian references.

ASSOCIATION: Institute of Mathematics of the Ukrainian Academy of Sciences (Instytut matematyky AN URSR)

SUBMITTED: 5 April 1957

AVAILABLE: Library of Congress

Card 2/2 1. Mathematics-Theory

SOV/24-58-8-9/37

AUTHORS: Ishlinskiy, A. Yu., Malashenko, S.V. and Temchenko, M.Ye. (Kiyev)

TITLE: On the Branching of Stable Positions of Dynamical Equilibrium for a Certain Mechanical System (O razvetvlenii ustoychivykh polozheniy dinamicheskogo ravnovesiya odnoy mekhanicheskoy sistemy)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 8, pp 53-61 (USSR)

ABSTRACT: In the course of investigations carried out at the Institute of Mathematics and Structural Mechanics of the Ac.Sc., Ukrainian SSR, a new theoretical case was discovered of a mechanical system where the branching form and the original form are simultaneously stable, and it is to the study of this case that the present paper is devoted. The authors consider an axis-symmetric rigid body suspended by a completely flexible massless string which is in a position of relative equilibrium with respect to a system of coordinates rotating about the axis of ζ with constant angular velocity. It is assumed that the force of gravity and the tension in the string are the only external forces. Let α denote the angle

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SOV/24-58-8-9/37

On the Branching of Stable Positions of Dynamical Equilibrium for a Certain Mechanical System

between the direction of the string and the vertical ξ, and let φ denote the angle between the vertical and the axis of symmetry of the body. Considering the case when the body is not far from a position in which the string and the axis of symmetry of the body coincide with the vertical, in which case α and φ are small, the condition is derived that the approximate equations for α and φ should have a non-zero solution. For an oblong body this yields four values of the angular velocity $\pm \omega_1^*$, $\pm \omega_2^*$. Thus, apart from the position of dynamical equilibrium in which $\alpha = 0$ and $\varphi = 0$ there are two other possible equilibrium positions. To test the theoretical results, a series of experiments was performed. The authors consider that the theoretical and experimental investigations are in satisfactory agreement.

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SOV/24-58-8-9/37

On the Branching of Stable Positions of Dynamical Equilibrium for a Certain Mechanical System

There are 17 figures, 2 tables and 4 Soviet references.

SUBMITTED: May 29, 1957.

1. Mechanics--Theory 2. Mathematics

Card 3/3

AUTHOR: Ishlinskiy , A.Yu. (Moscow) SOV/40-22-3-8/21

TITLE: On the Theory of Complicated Gyroscopic Systems for Stabilization (K teorii slozhnykh sistem giroskopicheskoy stabilizatsii)

PERIODICAL: Prikladnaya matematika i mekhanika, 1958, Vol 22, Nr 3, pp 359 - 373 (USSR)

ABSTRACT: In the calculation of motions of complicated gyroscopic systems the second method of Lagrange is generally applied for the set up of the equation of motion. Now the author wants to show that it is often more suitable to start directly from the theorem of momentum. He thinks it is possible to save the clearness of the equations in this way.
At first it is shown that in the calculation of motions of complicated gyroscopic systems, which are used for stabilization or navigation, in general there occur only very slow displacements of the gyro axis. For these so-called precession motions it is allowed to disregard the inertia effects of the housing of the gyroscope and of the Cardan rings. Equations of motion are thus obtained, the degree of which is considerably decreased compared with the degree of the complete

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On the Theory of Complicated Gyroscopic Systems for Stabilization SOV/40-22-3-8/21

equations. The exactness of the solutions of these simplified equations is generally sufficient for practical purposes. If, however, transition functions are to be investigated, then in most cases it cannot be avoided to take into account the influence of masses, housings and Cardan rings.
It is shown that the simplified theory of the gyroscopic instruments can be enlarged in such a way that the gyroscopic system is installed on a moved carrier so that the characteristic motions of this carrier occur in the equations of motion. Such equations were already applied, however, some decades ago, e.g. by Schuler.
In the paper only some quite general set ups are contained and equations are calculated without investigating the solutions of these equations or the behavior of special gyroscopic instruments.

There are 9 figures, and 3 references, 2 of which are Soviet, and 1 is English.

SUBMITTED: February 14, 1958

Card 2/2

KULEBAKIN, V.S., akademik, otv.red.; BODNER, V.A., doktor tekhn.nauk, red.; IVAKHNENKO, A.G., doktor tekhn.nauk; red.; ISHLINSKIY, A.Yu., akademik, red.; KACHANOVA, N.A., kand.tekhn.nauk, red.; KUZNETSOV, P.I., doktor fiz.-matem.nauk, red.; KUKHTENKO, A.I., doktor tekhn.nauk, red.; PETROV, B.N., red.; POPOV, Ye.P., doktor tekhn.nauk, red.; ULANOV, G.M., doktor tekhn.nauk, red.; KHRENOV, K.K., akademik, red.; CHINAYEV, P.I., kand.tekhn.nauk, red.; CHUMAKOV, N.M., kand.tekhn.nauk, red.; KRUGLOV, G.V., tekhn.red.

[Invariancy theory and its application to automatic devices] Teoriia invariantnosti i ee primenenie v avtomaticheskikh ustroistvakh; trudy soveshchaniia. Moskva, Akad.nauk USSR, Otd-nie tekhn.nauk, 1959. 381 p. (MIRA 13:7)

1. Soveshchaniye po teorii invariantnosti i eye primeneniyu v avtomaticheskikh ustroystvakh, Kiyev, 1958. 2. AN USSR (for Ishlinskiy, Khrenov). 3. Chlen-korresp.AN SSSR (for Petrov). (Automatic control)

ISHLINSKIY, O.Yu. [Ishlins'kyi, O.IU.]; POGREBETSKIY, Y.B. [Pohrebys'kyi, I.B.]

Contribution of O.M. Liapunov to the solid state dynamics. Ist.-mat. zbir. 1:140-150 '59. (MIRA 14:2)
(Dynamics)

ISHLINSKIY, A.Yu. (Moskva)

Autonomous determination of the position of a moving object by means of a gyroscopic space compass, direction gyroscope, and intergrating device. Prikl. mat. i mekh. 23 no.1:58-63 Ja-F '59. (Gyroscope)

SOLODOVNIKOV, V.V., prof., doktor tekhn.nauk, red.; BOGOLYUBOV, N.N., akademik, red.; ISHLINSKIY, A.Yu., akademik, red.; KAZAKEVICH, V.V., prof., doktor tekhn.nauk, red.; LYAPUNOV, A.A., prof., doktor fiz.-mat.nauk, red.; PETROV, B.N., red.; POPOV, Ye.P., prof., doktor tekhn.nauk, red.; POSPELOV, G.S., prof., doktor tekhn.nauk, red.; RYABOV, B.A., prof., doktor tekhn.nauk, red.; ANISIMOV, B.V., dotsent, kand.tekhn.nauk, red.; PETROV, V.V., dotsent, doktor tekhn.nauk, red.; PLOTNIKOV, V.N., dotsent, kand.tekhn.nauk, red.; USHAKOV, V.B., doktor tekhn.nauk, red.; POLYAKOV, G.F., red.izd-va; SOKOLOVA, T.F., tekhn.red.

[Automatic control and computer engineering] Avtomaticheskoe upravlenie i vychislitel'naia tekhnika. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry. No.3. 1960. 489 p. (MIRA 13:7)

1. Chlen-korrespondent AN SSSR (for B.N.Petrov).
(Automatic control) (Electronic calculating machines)

ISHLINSKIY, A.Yu.

Work of Mikhail Alekseevich Lavrent'ev at the Academy of Sciences of the U.S.S.R. PMTF no.3:16-19 S-O'60. (MIRA 14:7)
(Lavrent'ev, Mikhail Alekseevich, 1900-)

ISHLINSKIY, A.Yu.; TEMCHENKO, M.Ye.

Slight oscillations of the vertical axis of a gyroscope having a cavity completely filled with an ideal incompressible liquid. PMTF no.3:65-75 S-O'60. (MIRA 14:7)

1. Institut matematiki AN USSR.
(Gyroscope)

Ishlinskiy, A. Yu.

S/103/60/021/05/13/013
B007/B011

AUTHORS: Topchiyev, A. V., Academician, Vice President of the Academy of Sciences USSR, Fedorov, Ye. K., Corresponding Member of the AS USSR, Acting as Senior Scientific Secretary of the Presidium of the Academy of Sciences USSR; Dorodnitsyn, A. A., Ishlinskiy, A. Yu., Petrov, B. N., Members of the Commission

TITLE: Information.
Byuro prezidiuma Akademii nauk Soyuza SSR (Office of the Presidium of the Academy of Sciences of the USSR). Resolution of February 12, 1960, No. 134, Moscow

PERIODICAL: Avtomatika i telemekhanika, 1960, Vol. 21, No. 5, pp. 655 - 656

TEXT: The paper under review contains the literal text of the above resolution. This consists of two parts: resolution on the theory of invariance and its application to automatic devices of October 20, 1958 (Kiyev), and the judgment of the Commission in connection with the dis-

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Information.
Byuro prezidiuma Akademii nauk Soyuza SSR (Office of the Presidium of the Academy of Sciences of the USSR).
Resolution of February 12, 1960, No. 134, Moscow

S/103/60/021/05/13/013
B007/B011

cussion on the theory of invariance. After having heard the Academician A. A. Dorodnitsyn's communication, (President of the komissiya Prezidiuma AN SSSR (Commission of the Presidium of the AS USSR)), on the resolution adopted on the theory of invariance and its application to automatic devices of October 20, 1958 (Kiyev), the Byuro Prezidiuma Akademii nauk SSSR (Office of the Presidium of the Academy of Sciences, USSR) decided to approve the judgment of the Commission of the Presidium of the AS USSR and to order its publication in the periodical "Avtomatika i telemekhanika". The judgment reads as follows: the Commission consisting of Academician A. A. Dorodnitsyn, Academician of the AS UkrSSR A. Yu. Ishlinskiy, and Corresponding Member of the AS USSR B. N. Petrov, and appointed by Academician A. V. Topchiyev, Vice President of the AS USSR on October 28, 1958 examined the following materials: the afore-mentioned resolution of October 20, 1958, the resolution of the Presidium

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Information.
Byuro prezidiuma Akademii nauk Soyuza SSR (Office of the Presidium of the Academy of Sciences of the USSR).
Resolution of February 12, 1960, No. 134, Moscow

of the AS USSR of April 1, 1941, the conclusions reached by the Commission of the Presidium of the AS USSR on Professor G. V. Shchipanov's work "Automatic Regulation of Systems With Some Degrees of Freedom", the work itself, as well as papers resulting from the discussion thereon. The Commission established the following: The work published by Professor G. V. Shchipanov in the periodical under consideration, 1939, No. 1, gave rise to a detailed discussion. By order of the Presidium of the AS USSR of March 4, 1940 a commission was formed consisting of Academician O. Yu. Shmidt, Vice President of the AS USSR, Academician S. A. Chaplygin, Academician S. L. Sobolev, Academician N. Ye. Kochin, and Corresponding Member of the AS USSR N. G. Bruyevich. The conclusions reached by the Commission were discussed at the session held by the Presidium of the AS USSR on April 1, 1941. These included the particular opinion of Academician V. S. Kulebakin and Academician N. N. Luzin. Papers by Academician N. N. Luzin, Academician V. S. Kulebakin, A. G.

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Information.
Byuro prezidiuma Akademii nauk Soyuza SSR
(Office of the Presidium of the Academy
of Sciences of the USSR).
Resolution of February 12, 1960, No. 134
Moscow

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Ivakhnenko, B. N. Petrov, G. M. Ulanov, and others were published on this subject in the following years. The meeting under discussion was held on October 16 to 20, 1958 in Kiyev. It had been convened by the Otdeleniye tekhnicheskikh nauk Akademii nauk USSR (Department of Technical Sciences of the Academy of Sciences UkrSSR), Kiyevskiy gorodskoy seminar (Kiyev Municipal Seminar), and Institut elektrotekhniki AN USSR (Institute of Electrical Engineering of the AS UkrSSR). In their resolution, the delegates referred to the necessity of working out methods of compensating disturbances and of further developing the principle of invariance. On the strength of its investigations, the Commission states the following in its judgment: The conclusions reached by the Commission in 1941 are right, but the statement of the principal mistake contained in the work by G. V. Shchipanov "Condition of Compensation" is too general and, therefore, inexact. His principal mistake was not to have formulated the said condition, but to have applied it to the calculation of

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Information.
Byuro prezidiuma Akademii nauk Soyuza SSR
(Office of the Presidium of the Academy
of Sciences of the USSR).
Resolution of February 12, 1960, No. 134,
Moscow

such a class of control systems as do not allow the use of compensation conditions. The "Compensation Condition" or "Invariance Condition" formulated by Professor G. V. Shchipanov led to a new mathematical relation which can be successfully applied when projecting a determined class of dynamic systems. With reference to the inaccurate formulation of the 1941 resolution, it is recommended that an article be published in one of the technical periodicals to make it clear in which cases the principle of invariance can be used, and in which cases it is not admissible.

ASSOCIATION: Byuro prezidiuma Akademii nauk Soyuza SSR (Office of the Presidium of the Academy of Sciences of the Union SSR)

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AUTHORS: Barenblatt, G.I., and Ishlinskiy, A.Yu. (Moscow)

TITLE: On the impact between a viscous-plastic bar and a rigid obstacle

PERIODICAL: Prikladnaya matematika i mekhanika, v. 26, no. 3, 1962, 497 - 502

TEXT: The impact problem is formulated and an effective approximate solution is obtained. A bar of finite length, made of incompressible viscous-plastic material, moves along its axis and hits at the moment t = 0 a rigid obstacle. It is assumed that the stresses, velocities, etc. are averaged over the bar-section. The relation between the mean stress σ and the strain-rate $\partial v/\partial x$, is

$$\frac{\partial v}{\partial x} = \begin{cases} \dfrac{\sigma + \sigma_0}{\mu} & (/\sigma/ \geqslant \sigma_0) \\ 0 & (/\sigma/ \leqslant \sigma_0) \end{cases} \qquad (1.1)$$

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where σ_0 is the critical stress and μ is the viscosity coefficient. At $t > 0$, the pattern of motion is as follows: The elastic disturbances travel instantaneously through the entire bar which is divided into 2 regions: the viscous-plastic region, where the critical stress is exceeded and viscous-plastic flow occurs, and the rigid region, where the critical stress is not exceeded and the bar moves like a rigid body. At the moving boundary between these two regions which has to be determined in the solution of the problem, the stresses and velocities are continuous. The velocity satisfies, in the viscous-plastic region, the heat-conductivity equation

$$\frac{\partial v}{\partial t} = a^2 \frac{\partial^2 v}{\partial x^2}, \quad a^2 = \frac{\mu}{\rho} \, (0 \leqslant x < x_0(t)). \tag{1.3}$$

The equation of motion of the rigid region reduces to

$$\frac{dv_0(t)}{dt} = -\frac{\sigma_0}{\rho[1 - x_0(t)]}. \tag{1.7}$$

The initial and boundary conditions are also set up. Thus, the problem amounts to determining the functions $v(x, t)$, $v_0(t)$ and $x_0(t)$, satisfying the above equations, i.e. to the problem of the moving boundary for the heat-conductivity equation, which does not lead to a well-known boundary-value problem. Dimensionless variables are introduced

$$u(\xi, \tau) = -\frac{v(x, t)}{v_0}, \quad \xi = \frac{x}{l}, \quad \xi_0(\tau) = \frac{x_0(t)}{l}, \quad \tau = \frac{a^2 t}{l^2}, \quad u_0(\tau) = \frac{v_0(t)}{v_0}. \qquad (2.1)$$

Eqs. (1.3), (1.7) and the boundary conditions are used for obtaining the system

$$\frac{\partial u}{\partial \tau} = \frac{\partial^2 u}{\partial \xi^2} \qquad (0 \leqslant \xi \leqslant \xi_0(\tau)) \qquad (2.2)$$

$$\frac{du_0(\tau)}{d\tau} = -\frac{s}{1 - \xi_0(\tau)} \qquad (2.3)$$

$$u[\xi_0(\tau), \tau] = u_0(\tau), \quad \frac{\partial}{\partial \xi} u[\xi_0(\tau), \tau] = 0, \quad u(0, \tau) = 0 \quad (\tau > 0) \qquad (2.4)$$

where s is Saint-Venant's parameter. An approximate solution to system (2.2) - (2.4) is obtained on the basis of von-Karman-Pohlhausen's method of boundary-layer theory. Thereby the function $u(\xi, \tau)$ is approximated by the formula

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On the impact between a viscous ...

$$u(\xi, \tau) = \begin{cases} 2u_0(\tau)\frac{\xi}{\xi_0(\tau)} - u_0(\tau)\frac{\xi^2}{\xi_0^2(\tau)} & (0 \leqslant \xi \leqslant \xi_0(\tau)) \\ u_0(\tau) & (\xi_0(\tau) \leqslant \xi \leqslant 1) \end{cases} \quad (3.1)$$

It is required that the function (3.1) satisfy Eq. (2.2) in the mean i.e. an integral formula, obtained from (2.2). From this formula, in conjunction with (2.3), it is possible to obtain the approximate solution. New variables are introduced:

$$p = \frac{u_0(\tau)}{s}, \quad q = \xi_0^2(\tau). \quad (3.5)$$

Thereupon one finally obtains

$$\frac{dq}{dp} = -12(1 - \sqrt{q}) + \frac{4q}{p}. \quad (3.8)$$

This equation is investigated graphically. The following qualitative conclusions were reached: The viscous-plastic region expands at the beginning of the motion, until it reaches a maximum; then it decreases and finally vanishes. In all the cases, a certain part of the bar, adjacent to the free boundary, remains undeformed. In general,

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the integral formula obtained, requires numerical integration. The results of the integration are plotted for various values of Saint-Venant's parameter s. With large s, it is possible to give the solution explicitly. Formulas are obtained for the most important parameters: the maximum value of the viscous-plastic region and the total time of motion. The obtained approximate formulas yield satisfactory results with $s > 2$ already. The function $f(\xi)$ is plotted (for various s), representing the changes in the shape of the bar after impact. There are 7 figures.

ASSOCIATION: Institut mekhaniki Moskovskogo gosudarstvennogo universiteta (Institute of Mechanics of Moscow State University)

SUBMITTED: February 15, 1962

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B172/B112

AUTHORS: Ishlinskiy, A. Yu., Academician, and Barenblatt, G. I.

TITLE: Collision of a viscoplastic rod with a solid obstacle

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 144, no. 4, 1962, 734-737

TEXT: The authors first show that the impact problem of a rod consisting of viscoplastic material, when considered quasi-unidimensionally (i.e. averaged over the cross section), can be described by the equation of heat conduction. Here, unlike in the classical problems of mathematical physics, the boundary to the domain of solution is independent of time. By a formulation based on the Kármán - Pohlhausen method of the boundary layer theory the problem is reduced to solving an ordinary differential equation. This formulation is such that instead of the differential equation a corresponding integral relation is satisfied. For very small and very high values of the Saint - Venant number a closed integration of the equation is possible. The results of numerical evaluations and of qualitative considerations are set out in several diagrams. Finally, it is shown how the changes in the shape of the rod can be calculated from

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PHASE I BOOK EXPLOITATION SOV/6421

Ishlinskiy, Aleksandr Yul'yevich

Mekhanika giroskopicheskikh sistem (The Mechanics of Gyroscopic Systems) Moscow, Izd-vo AN SSSR, 1963. 482 p. 5000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Otdeleniye tekhnicheskikh nauk.

Ed. of Publishing House: L. V. Kudryavtseva; Tech. Ed.: S. P. Golub'.

PURPOSE: This book is intended for engineers and designers concerned with problems of guidance and stabilization by use of gyroscopes.

COVERAGE: The book covers the theory of gyroscopic systems and the practical application of gyroscopes in guidance and stabilization systems. It treats gyroscopes, gyro-stabilized platforms, vertical gyros, directional gyros,

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gyro stabilization, the effects of structural deformations of gyroscopes and their suspensions, the analysis of errors in gyro instrumentation, linear and nonlinear gyroscope systems, and the theory of servo systems. No personalities are mentioned. There are 94 references, of which 73 are Soviet (including 2 translations from English and 1 from German).

TABLE OF CONTENTS:

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Ch. I. Geometry and Kinematics of Gyroscopic Systems 9

1. Geometry of a gimbal suspension. Determining the rolling angles and the course of a ship. Gimbal error. Double-gimbal suspension 9
2. On the reciprocal rotation of two stabilized platforms during rolling of a ship 21
3. Stabilization errors caused by the inaccuracy of assembly of gimbal suspensions (geometry of two double-gimbal suspensions) 28

KULEBAKIN, V.S., akademik, otv. red.; PETROV, B.N., akademik, otv. red.; BODNER, V.A., doktor tekhn. nauk, red.; VORONOV, A.A., doktor tekhn. nauk, red.; IVAKHNENKO, A.G., red.; ISHLINSKIY, A.Yu., akademik, red.; KOSTYUK, O.M., kand. tekhn. nauk, red.; KRASSOV, I.M., kand. tekhn. nauk, red.; KUNTSEVICH, V.M., kand. tekhn. nauk, red.; KUKHTENKO, A.I., red.; RYABOV, B.A., doktor tekhn. nauk, red.; SIMONOV, N.I., doktor fiz.-mat. nauk, red.; ULANOV, G.M., doktor tekhn. nauk, red.; FEDOROV, S.M., kand. tekhn. nauk, red.; TSYPKIN, Ya.Z., doktor tekhn. nauk, red.; CHINAYEV, P.I., kand. tekhn. nauk, red.; KRUTOVA, I.N., kand. tekhn. nauk, red.; RUTKOVSKIY, V.Yu., kand. tekhn. nauk, red.

[Invariancy theory in automatic control systems; transactions] Teoriia invariantnosti v sistemakh avtomaticheskogo upravleniia; trudy. Moskva, Nauka, 1964. 503 p. (MIRA 18:2)

1. Vsesoyuznoye soveshchaniye po teorii invariantnosti i yeye primeneniyu v avtomaticheskikh ustroystvakh. 2d, Kiev, 1962. 2. Chlen-korrespondent AN Ukr.SSR (for Ivakhnenko, Kukhtenko).

L 16680-65 EWT(1)/FSF(h) IJP(c)/ASD(a)-5

ACCESSION NR: AP4045621 S/0020/64/158/002/0292/0293

AUTHOR: Arkhangel'skiy, Yu. A.; Ishlinskiy, A. Yu.

TITLE: New partial solutions of the problem concerning the motion of a heavy solid body about a fixed point

SOURCE: AN SSSR. Doklady*, v. 158, no. 2, 1964, 292-293

TOPIC TAGS: Euler Poisson equation, heavy body rotation, periodic solution, solid body rotation, analytical mechanics

ABSTRACT: The paper deals with the application of the Euler-Poisson equations which can be, under certain circumstances, reduced to a quasilinear autonomic system with two degrees of freedom, to the problem of a heavy body with a fixed point brought into rapid rotation about a major or minor axis of the ellipsoid of inertia. With the help of the results of a previous paper (Prikl. Mat. i mekh. 27, #5 (1963)), the author shows that the Euler-Poisson equations under specified conditions have periodic solutions, and proves two theorems concerning the para-

Card 1/2

L 16679-65
ACCESSION NR: AP4045623

ASSOCIATION: None

SUBMITTED: 16Apr64 ENCL: 00

SUB CODE: AC, ME NO REF SOV: 004 OTHER: 004

Card 2/2

L 15633-65 EWT(1) ASD-3/IJP(c)/ESD(dp)/ESD(t)/AEDC(a)/ASD(f)-2

ACCESSION NR: AP4049123 S/0020/64/159/001/0036/0038

AUTHORS: Arkhangel'skiy, Yu. A.; Ishlinskiy, A. Yu. (Academician)

B

TITLE: New particular solutions to the problem of motion of a solid heavy body around a fixed point

SOURCE: AN SSSR. Doklady*, v. 159, no. 1, 1964, 36-38

TOPIC TAGS: solid body, Euler equation, motion

ABSTRACT: The author studies $A\frac{dp}{dt}+(C-B)qr=Mg(y_0\gamma''-z_0\gamma')$, $\frac{d\gamma}{dt}=r\gamma'-q\gamma''$

$$\begin{pmatrix} ABC, & pqr \\ \gamma\gamma'\gamma'', & x_0y_0z_0 \end{pmatrix}$$

subject to r_0 large $\gamma_0''\neq 0, \pm 1$; $\lim_{r_0\to\infty}(p_0^2+q_0^2)<\infty$ $(u_0=u(t)_{t=0})$.

Let $\omega^2=\frac{(A-C)(B-C)}{AB}$. He gives conditions for periodic solutions when $\omega = 1/2$ and relates them to the Euler angles. He applies his results to the Kovalevskiy case. Orig. art. has: 8 formulas.

Card 1/2

L 15633-65
ACCESSION NR: AP4049123

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 08May64

ENCL: 00

SUB CODE: MA, ME

NO REF SOV: 003

OTHER: 000

Card 2/2

L 34514-65 EEC-4/EED-2/EEO-2/EWP(m)/EEC(k)-2/EWG(v)/EWA(c)/EWT(d)/EWT(1)/FBD/FS(v)-3/ EEC(a)/EEC(j)/EEC(r)/EWA(d)/EEC(c)-2/FSS-2 Pe-5/Pg-4/Pn-4/Pk-4/Pl-4/Pn-4/ Po-4/Pq-4/Pac-4/Pae-2 IJP(c) GW/GS/AST

ACCESSION NR: AT5004112 S/0000/64/000/000/0056/0064

AUTHOR: Ishlinskiy, A. Yu. (Academician)

TITLE: The ideas of the theory of invariance and inertial navigation

SOURCE: Vsesoyuznoye soveshchaniye po teorii invariantnosti i yeye primeneniyu v avtomaticheskikh sistemakh. 2d, Kiev, 1962. Teoriya invariantnosti v sistemakh avtomaticheskogo upravleniya (Theory of invariance in automatic control systems); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 56-64

TOPIC TAGS: invariance, self regulating system, control theory, gyroscope, earth satellite, automatic control system, inertial navigation

ABSTRACT: This is a review article dealing with the basic concepts of the theory of invariance as pertains to automatic control systems, that is, systems in which perturbations impinging on the system are automatically compensated for. The basic ideas are illustrated using the case of a pendulum, both neglecting and considering the curvature of the Earth. This example is then applied to the problem of inertial navigation of a satellite as illustrated in Fig. 1 of the Enclosure. The object in the figure is assumed to be traveling along a great circle of the Earth. From the point of view of the theory of invariance, the compensating

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L 34514-65

ACCESSION NR: AT5004112

force is shown to be M(t). Various applications of the solution of this gyroscopic control problem to orbiting objects are then presented. Orig. art. has: 4 figures and 44 formulas.

ASSOCIATION: None

SUBMITTED: 24Sep64 ENCL: 01 SUB CODE: NF, MA

NO REF SOV: 006 OTHER: 000

Card 2/3

ISHLINSKIY, A.Yu. (Kiyev); SLEPTSOVA, G.P. (Kiyev)

Impact of a viscoplastic rod on a rigid obstacle. Prikl. mekh. 1 no.2:1-9 '65. (MIRA 18:6)

1. Institut matematiki AN UkrSSR i Kiyevskiy inzhenerno-stroitel'nyy institut.

PEL'POR, Dmitriy Sergeyevich. Prinimali uchastiye: KOLOSOV, Yu.A., kand. tekhn. nauk; SUMAROKOV, N.P., aspirant; ISHLINSKIY, A.Yu., akademik, retsenzent; MIKHALEV, I.A., kand. tekhn. nauk, prof., nauchn. red.; SUVOROVA, I.A., red.

[Theory of giroscopic stabilizers] Teoriia giroskopicheskikh stabilizatorov. Moskva, Mashinostroenie, 1965. 347 p. (MIRA 18:12)

FEDORENKO, N.P., akademik; SUKACHEV, V.N., akademik; KARAKEYEV, K.K.; FRANK, G.M.; KONSTANTINOV, B.P., akademik; ASTAUROV, B.L.; YEFIMOV, A.N.; SHUMILOVSKIY, N.N.; ISHLINSKIY, A.Yu., akademik; GERASIMOV, I.P., akademik; KAZARNOVSKIY, I.A.; BYKHOVSKIY, B.Ye., akademik; ZHEBRAK, A.R., akademik

Discussion of the annual report. Vest.AN SSSR 35 no.3:95-112 Mr '65. (MIRA 18:4)

1. Prezident AN Kirgizskoy SSR (for Karakeyev). 2. Chleny-korrespondenty AN SSSR (for Frank, Astaurov, Yefimov, Kazarnovskiy). 3. AN Kirgizskoy SSR (for Shumilovskiy). 4. AN BSSR (for Zhebrak).

L 50526-65 EEO-2/EWT(d)/FSS-2/EEC(k)-2/EWG(v)/EED-2/EWA(c) Pn-4/Po-4/Pe-5/Pq-4/Pg-4/Pk-4/Pl-4 BC

ACCESSION NR: AP5012757 UR/0020/65/161/006/1291/1294

AUTHOR: Ishlinskiy, A. Yu. (Academician)

TITLE: Concerning one mechanical analogy of a gyroscopic stabilizer with elements that have elastic compliance

SOURCE: AN SSSR. Doklady, v. 161, no. 6, 1965, 1291-1294

TOPIC TAGS: gyroscopic stabilization system, elastic compliance, stability analysis

ABSTRACT: It is pointed out that the equations of motion of a gyroscopic stabilizer, which are usually based on the assumption that the stabilizer elements are absolutely rigid, lead in some cases to incorrect values of natural frequencies of the system and to erroneous conclusions concerning its stability, unless the elastic compliance of the gyroscope suspension and of the mechanical transmissions in the gyrostabilizer are taken into account. Equations of motion are derived with allowance for the compliance of the gyroscope rotor bearings in the radial direction and of the reduction-gear teeth (other compliances are much smaller and

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L 50526-65
ACCESSION NR: AP5012757

are neglected). This reduces the gyroscopic system to an aggregate of four absolutely rigid bodies (gyroscope rotor, gyroscope case, outer gimbal of the suspension, and rotor of the driving motor). A mechanical analog of such a gyroscopic system is used to derive a set of equations of motion. The original gyroscopic stabilizer and its mechanical analog are shown in Fig. 1 of the Enclosure. An approximate equation is obtained, under the assumption that the low-frequency oscillations of the gyroscopic stabilizer change little, from which it is possible to estimate the stability of the system without a preliminary numerical analysis of the total set of its equations. Orig. art. has: 4 figures and 1[?] formulas. [02]

ASSOCIATION: none

SUBMITTED: 21Jan65 ENCL: 01 SUB CODE: ME, NG

NO REF SOV: 001 OTHER: 000 ATD PRESS: 4007

Card 2/3

L 2336-66 EWT(d)/FSS-2/EEC(k)-2/EED-2/EWA(c) BC

ACCESSION NR: AP5021881 UR/0020/65/163/006/1334/1337

41
35
B

AUTHOR: Ishlinskiy, A. Yu. (Academician)

44

TITLE: On the decreased stability of two-axis gyroscopic stabilizers compared with single-axis ones

9,44

SOURCE: AN SSSR. Doklady, v. 163, no. 6, 1965, 1334-1337

TOPIC TAGS: gyroscope, gyroscopic stabilizer, differential equation, eigenfrequency

ABSTRACT: A stability calculation is performed in order to explain the experimental observation that two- and three-axis gyroscopic stabilizers are less stable than single-axis gyro-stabilizers. From the differential equations describing small amplitude oscillations in a simplified model of the two-axis gyro-stabilizer, the secular equation determining the eigenfrequencies λ is obtained. The equation has the form $S^2(\lambda) + P^2(\lambda) = 0,$

where $S(\lambda) = \lambda^3 + a\lambda^2 + b\lambda + d = 0$

is the secular equation for a single-axis gyro-stabilizer in this model and $P(\lambda)/\lambda^2$, as well as a, b, and d, are functions of the mechanical and electrical

Card 1/2

Card 2/2

L 00073-67 EWT(d) IJP(c)
ACC NR: AP6030805 SOURCE CODE: UR/0424/66/000/003/0003/0008

AUTHOR: Ishlinskiy, A. Yu. (Moscow)

ORG: none

TITLE: On the azimuthal mismatch of two Cardan joints

SOURCE: Inzhenernyy zhurnal. Mekhanika tverdogo tela, no. 3, 1966, 3-8

TOPIC TAGS: trigonometry, motion mechanics

ABSTRACT: The trigonometric relationships between two Cardan joints are studied in order to obtain the azimuthal mismatch between them and to calculate the relative angle of rotation of the rings connected by these joints. It is assumed that the system carrying the two rings (an outer ring and an inner ring) is moving relative to the object whose azimuth is to be determined. It is shown that the mismatch angle γ can be given by

$$\sin\gamma = \frac{\cos\theta'}{\cos\psi}\cos\psi^{\circ}\sin\gamma^{\circ} - \frac{\sin\theta'}{\cos\psi}\sin\psi^{\circ}$$

where ψ is the angle of rotation of the internal ring relative to the outer, and θ is the angle of rotation of the outer ring relative to the system. The above expression is then given in terms of three independent parameters,

$$\sin\gamma = \frac{\sqrt{1-\cos^2\varkappa-\cos^2\mu-\cos^2\mu'+2\cos\mu\cos\mu'\cos\varkappa}}{\sin\mu\sin\mu'}$$

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L 09073-67

ACC NR: AP6030805

where $\mu = {}^1/_2\pi + \psi$; $\mu' = {}^1/_2\pi + \psi'$

and the remaining angles are shown on Fig. 1.

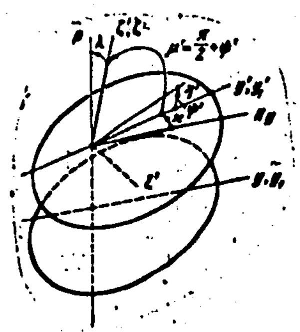

Fig. 1

Orig. art. has: 30 equations and 5 figures.

SUB CODE: 20/ SUBM DATE: 19Mar66/ ORIG REF: 001

mechanisms

Card 2/2