8(2) PHASE I BOOK EXPLOITATION SOV/1676

Lur'ye, Arkadiy Gertsevich

Teoriya ferrorezonansnykh stabilizatorov napryazheniya (Theory of Ferroresonant Voltage Regulators) Moscow, Gosenergoizdat, 1958. 129 p. 11,000 copies printed.

Ed.: M.I. Oranskiy; Tech. Ed.: A.A. Zabrodina.

PURPOSE: This book is intended for engineers designing and using voltage regulators and also for scientific workers and students of electrical-engineering vuzes and departments.

COVERAGE: The author explains the theory of ferroresonant voltage regulators. He describes methods of designing the basic circuits of ferroresonant voltage regulators and points out some of their applications. In the foreword the author states that he followed the terminology recommendations of the publication,"Terminology of the Theoretical Electrical Engineering." Ferroresonant phenomena have been investigated and described by P.L. Kalantarov. Applica-

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tion of ferroresonance to voltage regulation has been described in papers by S.P. Pivovarov, V.V. Kovalevskaya, M.G. Lozinskiy, Ye.V. Sazanov, A.G. Lur'ye, G.K. Yevdokimov, and others. According to the author, however, there is still no unified, general, and systematic theory of ferroresonant regulators. The author attempts to elaborate such a theory. The author thanks Professor N.N. Shumilovskiy, Doctor of Technical Sciences, and Engineer I.G. Gol'dreyer for their comments. There are 73 references, 47 of which are Soviet, 14 German, 10 English and 2 French.

TABLE OF CONTENTS:

Theory of Ferroresonant Voltage Regulators SOV/1676

AVAILABLE: Library of Congress (TK.2851 .L83)

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14(3) SOV/176-58-7-12/17

AUTHOR: Lur'ye, A., Engineer-Colonel

TITLE: Estimates of Electric Wiring Used in Working Condenser Exploders (Raschët elektrovzryvnykh setey pri ispol'zovanii kondensatornykh podryvnykh mashinok)

PERIODICAL: Voyenno-inzhenernyy zhurnal, 1958, Nr 7, pp 33-38 (USSR)

ABSTRACT: The author describes condenser blasting machines (exploders) type KPM-1 and KPM-2 which, he says, are more reliable and are superior to electro-dynamic machines PM-1 and PM-2. The condenser machines can be linked together and therefore made more powerful and suitable for use with a complex network, as well as with separate nets. The limits of resistance to detonation depend upon the capacity of the condensators and the voltage with which they are charged, also upon the type of electrode tonators and upon the layout of the net. KPM-1 has a limit of resistance equal to 350 ohm

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Estimates of Electric Wiring Used in Working Condenser Exploders

and with parallel connections of 5 electrodetonators to 14 ohm. In the KPM-2 unit, the corresponding figures are 900 om and 50 om. The author gives examples of the limits of resistance in the individual settings. There are 5 diagrams and 1 Soviet reference.

ZAYTSEV, Ivan Alekseyevich; LUR'YE, Aradiy Gertsevich; YANKO-TRINITSKIY, A.A., prof. retsenzent; KUZNETSOV, I.F., red.; SOBOLEVA, Ye.M., tekhn. red.

[Textbook on the theoretical principles of electrical engineering] Zadachnik po teoreticheskim osnovam elektrotekhniki. Izd.2., perer. Moskva, Gos.energ.izd-vo, 1961. 301 p. (MIRA 14:12)
(Electric engineering)

ACC NR: AT6028970 SOURCE CODE: UR/0000/65/000/000/0091/0100

AUTHOR: Lur'ye, A. G.

ORG: Novosibirsk Geological Administration (Novosibirskoye geologicheskoye upravlenie)

TITLE: The central-ray method and its application in the western Siberian lowlands

SOURCE: Vsesoyuznyy seminar po novoy metodike seysmorazvedki. Seysmorazvedka s primeneniyem gruppirovaniya vzryvov na dlinnykh bazakh i sposoba tsentral'nykh luchey (Seismic prospecting using the grouping of shots on long bases and the method of central rays); trudy seminara. Moscow, Izd-vo Nedra, 1965, 91-100

TOPIC TAGS: seismic prospecting, underground explosion, seismic wave, seismology, low velocity zone, upper mantle

ABSTRACT: An analysis is made of the methods of observation, correlation, and interpretation used in the central-ray method (STsL), which is based on the reception of reflected waves at the shot point. The use of STsL in remote regions of the western Siberia lowland is described. The work was carried out along rivers with apparatus mounted aboard power boats. The effectiveness of the method in solving reconnaissance problems was determined for regions with reference

ACC NR: AT6028970

or extended reflecting boundaries. It was found expedient to complement STsL with continuous profiling observations. Orig. art. has: 10 formulas and 5 figures.

SUB CODE: 08/ SUBM DATE: 30Apr65/ ORIG REF: 002

Card 2/2

FLOROV, R.S., kand.tekhn.nauk; LUR'YE, A.I., inzh.

Determining welding deformations in crane beams during manufacture
Prom.stroi. 38 no.3:55-57 '60. (MIRA 13:6)
(Cranes, derricks, etc.) (Electric welding)

FLOROV, R.S., kand.tekhn.nauk; LÚR'YE, A.I., inzh.

Study of the deformation of welded I-beams from longitudinal seams. Trudy Ural. politekh. inst. no.99:170-173 '60. (MIRA 14:5)
(Girders--Testing)

ZASTEZHKO, Yu.S.; TERESHCHENKO, V.A.; LUR'YE, A.I.

New data on the geothermic conditions of the Dnieper-Donets Lowland. Izv. AN SSSR. Ser.geol. 30 no.11:115-117 N '65.
(MIRA 18:12)

1. Laboratoriya gidrogeologii i geokhimii podzemnykh vod Ukrainskogo nauchno-issledovatel'skogo instituta prirodnogo gaza, Khar'kov. Submitted August 12, 1964.

ZASTEZHKO, Yu.S.; LUR'YE, A.I.

Some characteristics of geothermal conditions in the Shebelinka gas field. Neft. i gaz. prom. 3:6-11 Jl-S '65.
(MIRA 18:11)

LURIYE, A. I.

"Operational Calculus as Applied to Problems in Mechanics," United Technical Publishers, 1938

IL'IE, A. I.

Priblizhennoye Resheniye Nekotorykh Zadach O Kruchenii I Izgibesterzhnya. L., Trudy Industr. IN-TA, 3:1 (1939), 121-126.

So: Mathematics in the USSR, 1917-1947
edited by Kursoh, A. G.
Markushevich, A. I.
Rashevskiy, P. K.
Moscow-Lenigard, 1948

LUR'YE, A. I.

"On Saint-Venant's Problem for Naturally Twisted Bars. I."

Dok. AN, 24, No 1, 1939.
Dok. AN, 24, No 8, 1939.

LUR'YE, A. I.

"Determination of Displacements by means of the Tensor of Deformation."

Prik. Matemat. i Mekh., 4, No 1, 1940.

LURYE, A.I.

LUR'E, A.I.

Ob ustoichivosti odnogo klassa reguliruemykh sistem. (Prikladnaia matematika i mekhanika, 1945, v. 9, no. 5, p. 353-367, bibliography)

Title tr.: Stability of one type of system under control

QA801.P7 1945

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

LUR'YE, A. I.

"General Theory of Thin Elastic Shells."

Prik. Matemat. i Mekh., 4, No 2, 1940.

LUR'YE, A. I.

Lourye, A. I. Concentration of stresses in the vicinity of an aperture in the surface of a circular cylinder. Appl. Math. Mech. [Akad. Nauk SSSR. Prikl. Mat. Mech.] 10, 397–406 (1946). (Russian. English summary)

Math. Mech. [Akad. Nauk SSSR. Prikl. Mat. Mech.] 10, 397–406 (1946). (Russian. English summary)

Source: Mathematical Reviews, Vol 8, No. 2

LUR'YE, A.I.

*Lur'e, A. I. Statika tonkostennyn uprugih obolocek. [Statics of Thin Elastic Shells]. OGIZ, Moscow-Leningrad, 1947. 252 pp.

Chapter 1. The equations of equilibrium of an elastic symmetrically loaded shell of revolution. Chapter 2. Solution of the fundamental differential equations for a shell of the simplest geometrical form. Chapter 3. Approximate solution of the fundamental differential equations of a symmetrically loaded shell of revolution. Chapter 4. Arbitrarily loaded cylindrical shell. *Table of contents.*

Source: Mathematical Reviews, Vol No.

PA40T89

Sep/Oct 1947

USSR/Physics
Regulators
Oscillations

"Auto-oscillations in Some Regulatory Systems," A. I. Lur'ye, 14 pp

"Avtomatika i Telemekhanika" Vol VIII, No 5

Method of locating auto-oscillation in automatic regulatory systems is demonstrated which uses the canonical form of the equation of motion. Method is given for constructing the equation, which determines the period of the auto-oscillations and makes it possible to study their stability. It is shown that the study of auto-oscillations by the

40T89

LC

Sep/Oct 1947

USSR/Physics (Contd)

Poincare method is simplified by using the canonical form of the equation of motion. The general equation for determining the generated amplitudes is deduced.

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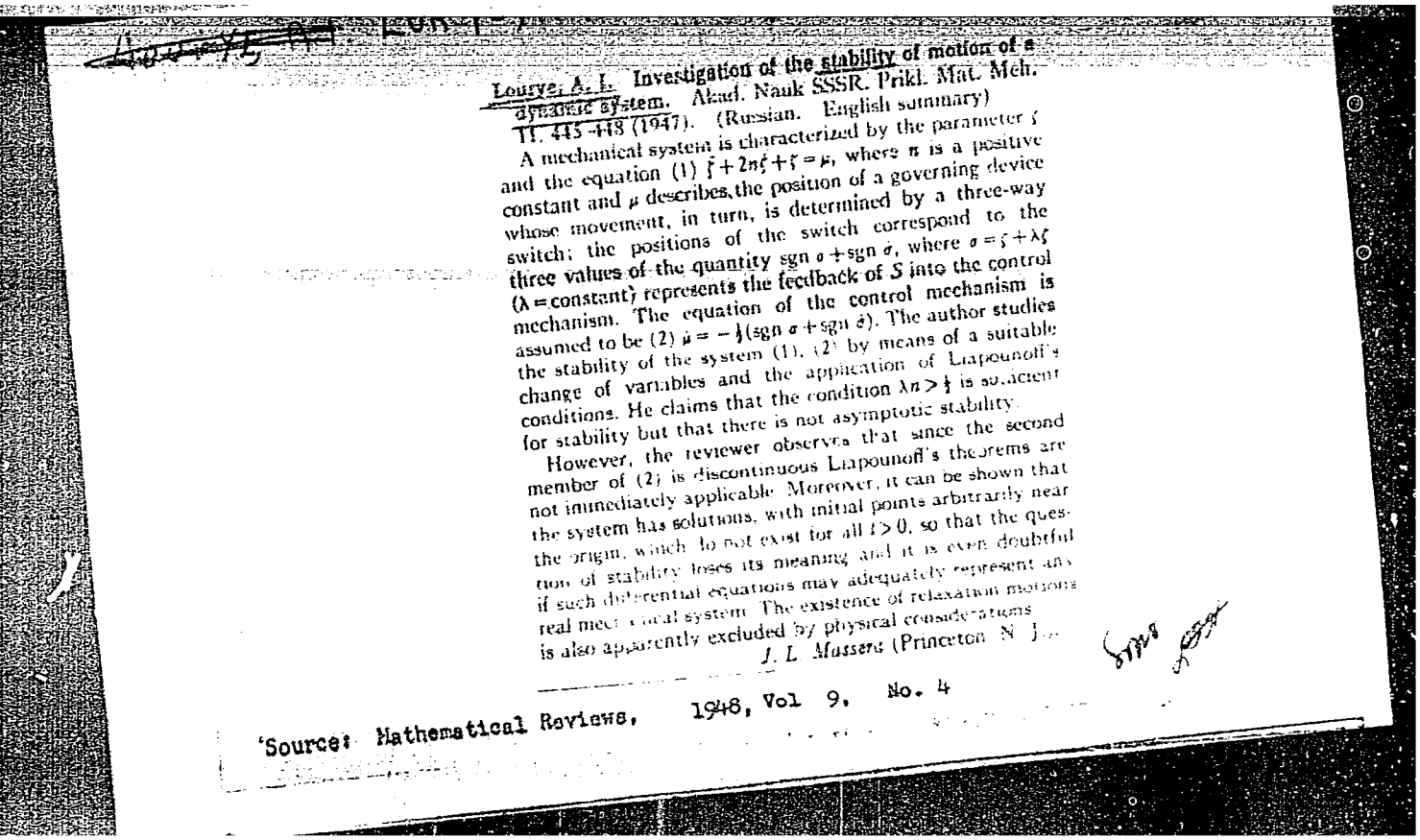
LUR'YE, A. I.



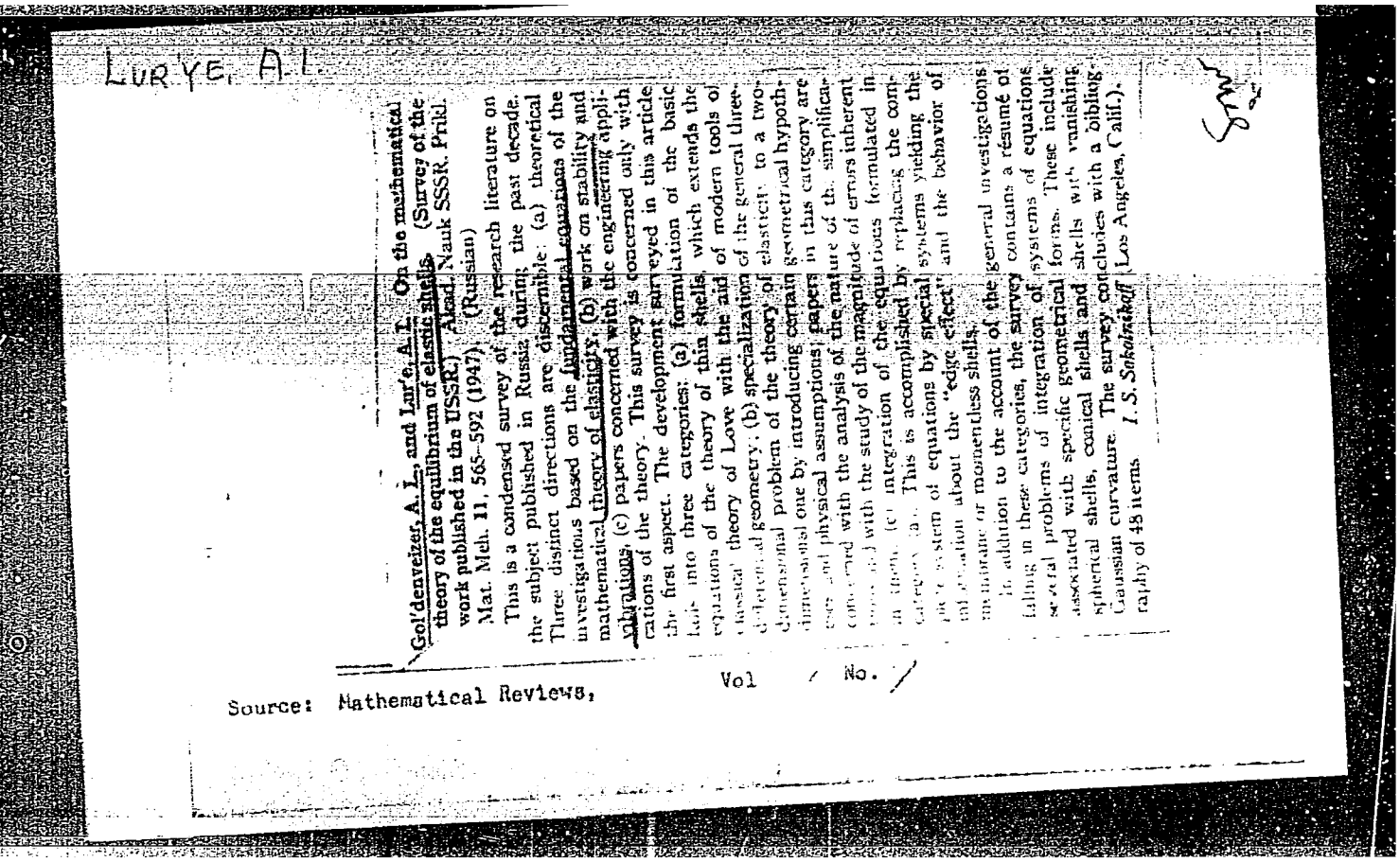
Lourye, A. I. Investigation of the stability of motion of a dynamic system. Akad. Nauk SSSR. Prikl. Mat. Meh. 11, 445–448 (1947). (Russian. English summary)

A mechanical system is characterized by the parameter ζ and the equation (1) $\ddot{\zeta}+2n\dot{\zeta}+\zeta=\mu$, where n is a positive constant and μ describes the position of a governing device whose movement, in turn, is determined by a three-way switch; the positions of the switch correspond to the three values of the quantity $\operatorname{sgn}\sigma+\operatorname{sgn}\dot{\sigma}$, where $\sigma=\zeta+\lambda\dot{\zeta}$ (λ = constant) represents the feedback of S into the control mechanism. The equation of the control mechanism is assumed to be (2) $\dot{\mu}=-\frac{1}{2}(\operatorname{sgn}\sigma+\operatorname{sgn}\dot{\sigma})$. The author studies the stability of the system (1), (2) by means of a suitable change of variables and the application of Liapounoff's conditions. He claims that the condition $\lambda n>\frac{1}{2}$ is sufficient for stability but that there is not asymptotic stability.

However, the reviewer observes that since the second member of (2) is discontinuous Liapounoff's theorems are not immediately applicable. Moreover, it can be shown that the system has solutions, with initial points arbitrarily near the origin, which do not exist for all $t>0$, so that the question of stability loses its meaning and it is even doubtful if such differential equations may adequately represent any real mechanical system. The existence of relaxation motions is also apparently excluded by physical considerations.

J. L. Massera (Princeton, N. J.)

Source: Mathematical Reviews, 1948, Vol 9, No. 4



LURYE, A.L.

Gol'denveizer, A. L., and Lur'e, A. I. On the mathematical theory of the equilibrium of elastic shells. (Survey of the work published in the USSR.) Akad. Nauk SSSR. Prikl. Mat. Meh. 11, 565–592 (1947). (Russian)

This is a condensed survey of the research literature on the subject published in Russia during the past decade. Three distinct directions are discernible: (a) theoretical investigations based on the fundamental equations of the mathematical theory of elasticity; (b) work on stability and vibrations; (c) papers concerned with the engineering applications of the theory. This survey is concerned only with the first aspect. The development surveyed in this article falls into three categories: (a) formulation of the basic equations of the theory of thin shells, which extends the classical theory of Love with the aid of modern tools of differential geometry; (b) specialization of the general three-dimensional problem of the theory of elasticity to a two-dimensional one by introducing certain geometrical hypotheses and physical assumptions; papers in this category are concerned with the analysis of the nature of the simplifications and with the study of the magnitude of errors inherent in [illegible]; (c) integration of the equations formulated in [illegible] categories. This is accomplished by replacing the complete system of equations by special systems yielding the [illegible] and the behavior of the "edge effect" and the determination about the [illegible] membraneless shells.

In addition to the account of the general investigations, the survey contains a résumé of several problems of integration of systems of equations associated with specific geometrical forms. These include spherical shells, conical shells and shells with vanishing Gaussian curvature. The survey concludes with a bibliography of 45 items. *I. S. Sokolnikoff* (Los Angeles, Calif.).

Source: Mathematical Reviews, Vol / No. /

LURYE, A.I

LUR'E, A. I., and L. G. LOITSIANSKII.

Kurs teoreticheskoi mekhaniki. Tom 1: Statika i kinemakhanika. Tom 2: Dinamika. Izd. 4, dop. i perer. Dopushcheno v kachestve ucheb. posobiia dlia vysshikh tekhn. ucheb. zavedenii. Leningrad, Gostekhizdat, 1948. 2 v., diagrs.

Title tr.: A course of theoretical mechanics. v. 1: Statics and kinematics; v. 2: Dynamics. Approved as a textbook for schools of advanced technical studies.

QA805.L63 1948

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

LUR'YE, A.I.

KACHANOV, L.M.; LUR'YE, A.I., prof., red.; LOYTSYANSKIY, L.G., prof., red.; DZHANELIDZE, G.Yu., red.; VOLCHOK, K.M., tekhn. red.

[Mechanics of plastic media] Mekhanika plasticheskikh sred. Leningrad, Gos. izd-vo tekhniko-teoret. lit-ry, 1948. 215 p. (MIRA 11:7)
(Deformations (Mechanics)) (Elastic solids)

LURYE, A.I.

Lur'e, A. I., and Finko, G. M. On the stability of regulation in the presence of retardation in the measuring organ of the regulator. Akad. Nauk SSSR. Inženernyĭ Sbornik 4, no. 2, 109–112 (1948). (Russian)

A differential-difference equation system of the form (*) $\dot{x}(t)+ax(t)+by(t)=0$, $\dot{y}(t)+cy(t)=dx(t-\tau)$, is solved by assuming $x=X\exp wt$, $y=Y\exp wt$: eliminating the constants X and Y leads to a transcendental equation for w. If the roots w all have negative real parts the system (*) is said to be stable. Conditions on the parameters sufficient for stability in this sense are obtained; these conditions require the determination of the least positive root of an auxiliary transcendental equation. *J. G. Wendel.*

Source: Mathematical Reviews, Vol 1[illegible] No. [illegible]

LUR'YE, A. I.

PA 18/49T10

USSR/Electronics
Circuits, Regulated
Oscillations, Steady

Sep/Oct 48

"The Steadiness of Auto-Oscillation in Regulated Circuits," A. I. Lur'ye, Leningrad Polytech Inst imeni M. I. Kalinin, 2 pp

"Avtomat i Telemekh" Vol IX, No 5

Completes mathematical exposition of subject problem which was covered more thoroughly in Lur'ye's previous work ("Avtomat i Telemekh" Vol VIII, No 5, 1947).

18/49T10

LURYE, A.I.

LUR'E, A. I.

O periodicheskom reshenii sistemy lineinykh uravenii s postoiannymi doeffitsientami. (Prikladnaia matematika i mekhanika, 1948, v. 12, no. 4, p. 353.-362, bibliography)

Title tr.: Periodic solution of systems of linear equations with constant coefficients.

Reviewed by J. L. Massera in Mathematical Reviews, 1949, v. 10, no. 3, p. 193.

QA801.P7 1948

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

LUR'YE, A.I.

Lur'e, A. I. On a canonical form of the equations of the theory of automatic regulation. Akad. Nauk SSSR. Prikl. Mat. Meh. 12, 651-666 (1948). (Russian)

The system

$$y_k = \sum_{i=1}^{n} b_{ki} y_i + h_k f(s), \qquad k = 1, \cdots, n,$$

$$s = \sum_{i=1}^{n} j_i y_i$$

is put into the canonical form

$$x_i = \lambda_i x_i + f(s), \qquad i = 1, \cdots, n,$$

$$\dot{s} = \sum_{i=1}^{n} \beta_i x_i - r f(s)$$

by means of a linear transformation $x_i = \sum_{k=1}^{n} c_k^{(i)} y_k$ in the case where the matrix $B = (b_{ki})$ has simple characteristic roots $\lambda_1, \cdots, \lambda_n$. Formulas are given for the constants $c_k^{(i)}, \beta_i, r$. Some physical examples are considered.

J. G. Wendel (New Haven, Conn.).

LaSalle, J. Uniqueness theorems and successive approximations. Ann. of Math. (2) 50, 722-7[illegible] (1949).

The author considers the system

$$y_i' = f_i(x, y_1, \cdots, y_n) = f_i(x, \cdots$$

in one independent and n dependent variables. Let G be the class of functions $g(x)$ continuous on $0 \leqq x$ [illegible] and satisfying [illegible] 0. Let the f_i's be continuous in a [illegible] defined by $0 \leqq$ [illegible] a, $l_i(x) \leqq y_i \leqq u_i(x)$, where $l_i(x)$, u_i [illegible] belong to G. An approximating sequence $T^m(g(x))$ is generated by replacing y by a vector $g(x)$ with components from G and integrating $f(x, g)$ [illegible] If T^m converges uniformly to a solution $g(x)$ is called a [illegible] approximation. If the f_i's are non-decreasing functions of the y's and if $l_i'(x) \leqq f_i[x, l(x)]$, $f_i[x, u(x)] \leqq u_i'(x)$, then $l(x)$ and $u(x)$ are zero approximations. For the case where the f_i's satisfy a generalized Lipschitz condition of considerable complexity the paper proves a uniqueness theorem which includes those of Osgood, Montel and Nagumo and also a theorem which specifies a subset of G composed of zero approximations and generalizes a theorem of Wintner [Amer. J. Math. 68, 13-19 (1946); these Rev. 7, 297]. For the case of more than one solution a result which leads to bounds on the difference of solutions is given.

J. M. Thomas (Durham, N. C.)

Source: Mathematical Reviews, 1950 Vol 11 No. 2

LUR'YE, A. I.

"Operational Calculus and Its Application to Problems in Mechanics", 2nd edition, State Publishing House for Technical and Theoretical Literature, 431 pp, 1950.

LURYE, A.I.

LUR'E, A.I.

O kharaktere granits oblasti ustoichivosti reguliruemykh sistem.
(Prikladnaia matematika i mekhanika, 1950, v. 14, no. 4. p. 371-382)

Title tr.: Character of the boundaries of stability zone of the systems under control.

QA801.P7 1950

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

LUR'YE, A.I.

Lur'e, A. I. On the equations of the general theory of elastic shells. Akad. Nauk SSSR. Prikl. Mat. Meh. 14, 358–360 (1950). (Russian)

In the classical theory of elastic shells the three-dimensional problem is reduced to a two-dimensional one through a specification of eight forces and moments which are statically equivalent to the distribution of the normal stresses σ_1 and σ_2 and the shear stresses $\tau_{12}=\tau_{21}$ along the lines of curvature in the middle section. Four of these quantities S_1, S_2, H_1, and H_2 are connected by the equation $S_1-S_2+H_1/R_1-H_2/R_2=0$ and are specially introduced to account for the shear stress τ_{12}. This note shows that in all equations of the elastic theory of shells these four quantities can be replaced by two quantities S and H given by:

$$2S=S_1+S_2-H_1/R_1-H_2/R_2, \quad 2H=H_1+H_2.$$

Further, within the limits of accuracy of the thin shell theory, S and H are given by:

$$S=\frac{Eh}{2(1+\nu)}\gamma, \quad H=\frac{Eh^3}{12(1+\nu)}\omega^*$$

where γ and ω^* are respectively the shear strain and the rotation of the middle surface.

H. I. Ansoff (Santa Monica, Calif.).

Source: Mathematical Reviews, Vol. 1 No. 1

LUR'YE, A. I.

14

2

†Lur'e, A. I. Nekotorye nelineĭnye zadachi teorii avtomaticeskogo regulirovaniya. [Some nonlinear problems of the theory of automatic regulation.] Gosudarstv. izdat. Tehn.-Teor. Lit., Moscow-Leningrad, 1951. 216 pp. 6 rubles.

Practically all the control systems considered in this monograph are described by equations of the form

$$\dot{\eta}_k = \sum_{l=1}^{n} b_{kl}\eta_l + n_k\xi \qquad (k = 1, \cdots, n)$$

(a)

$$\xi = f(\sigma), \quad \sigma = \sum_{l=1}^{n} p_l\eta_l - r\xi,$$

where the η_k are the controlled coordinates, ξ the coordinate of the regulating organ, $f(\sigma)$ the characteristic of the servomotor, b_{kl}, n_k, p_l, r constant parameters. The selection of problems and methods presented is motivated by the numerous original contributions of the author to this field. In Chapter 1 equations (a) are reduced to the canonical form

(b) $\dot{y}_k = \lambda_k y_k + f(\sigma), \quad \dot{\sigma} = \sum_{l=1}^{n} \beta_l y_l - rf(\sigma) \quad (k = 1, \cdots, n)$

by a linear transformation $\eta \to y$. Here the λ_k are the zeros, assumed distinct, of $|b_{kl} - \lambda\delta_{kl}|$. The β_l are expressed explicitly in terms of the parameters of (a). In Chapter 2 sufficient conditions for the stability in the large of the solution $y_k = 0$, $\sigma = 0$ of equations (b) are established. They are derived from a properly chosen "Liapounoff function" $V(y, \sigma)$ which is positive for all values of y, $\sigma \neq 0$ and whose time-derivative is negative for all functions $y(t)$, $\sigma(t) \neq 0$ satisfying (b). Chapter 3 deals with the existence and calculation of the self-oscillations of system (b). Discussed are the Bogolyubov-Krylov method of harmonic balance, the Poincaré-Malkin method of expansion and casting-out of secular terms, and the author's solution in closed form for a few special functions $f(\sigma)$. In the last chapter the behavior of the solutions of (b) on the boundaries of the region of stability of the linear system $\dot{y}_k = \lambda_k y_k$ (either one of the λ's is 0 or there is a pair of pure imaginary λ's) is analyzed. Most of the results here are due to Bautin [Akad. Nauk SSSR. Prikl. Mat. Mek. 12, 691–728 (1948); these Rev. 10, 456] and Alzerman [ibid. 14, 444–448 (1950); these Rev. 12, 181]. There are illustrative examples worked out in detail in all chapters. All the references given are to work in Russian.

M. Golomb (Lafayette, Ind.).

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LUR'YE, A. I.

PA 172T95

USSR/Physics - Regulation, Stability of Jan/Feb 51

"Problem of the Stability of Regulated Systems," A. I. Lur'ye, Leningrad Polytech Inst

"Priklad Matemat i Mekh" Vol XV, No 1, pp 67-74

Stability criteria in the large of one important class of regulated systems leads to establishment of nature of roots of certain system of quadratic eq. Presents effective method for investigating more than 2 quadratic eq, the case for 2 being comparatively easy. Submitted 2 Oct 50.

172T95

LUR'YE, A. I.

USSR/Mathematics - Servomechanisms Mar/Apr 51

"Intrinsically Instable Regulated Systems," A. I. Lur'ye, Leningrad Polytech Inst

"Prik Matemat i Mekh" Vol XV, No 2, pp 251-254

Discusses generalization of theory to systems instable for open cycle. Develops characteristics of system $f(\sigma)$ with initially set properties: $f(\sigma) = c\sigma + \varphi(\sigma)$ for $c > 0$ and $\sigma \neq$.

177T50

LUR'YE, A.I.

Mathematical Reviews
Vol. 14 No. 11
December, 1953
Mechanics.

Lur'e, A. I. Stressed state about an ellipsoidal cavity. Doklady Akad. Nauk SSSR (N.S.) 87, 709–710 (1952). (Russian)

The problem of the stress distribution around an ellipsoidal cavity in an infinite elastic medium is reconsidered. This problem was solved previously by M. A. Sadowsky and the reviewer [J. Appl. Mech. 16, 149–157 (1949); these Rev. 10, 760]. In the present paper the generating Boussinesq-Papkovich stress functions are assumed as improper incomplete elliptic integrals of the first and second kind, and the use of Jacobian elliptic functions, which is necessary to effect a reduction of the solution to tabulated functions, is avoided. A gain in transparency is claimed.

E. Sternberg (Chicago, Ill.).

Considers an unbounded elastic medium possessing a cavity in the form of a triaxial ellipsoid, under the assumption that at a sufficiently large distance from the cavity the stress state is homogeneous. Proposes to det the local stresses in the region adjoining the cavity. Presented by Acad. N.I.Muskhelishvili 6 Oct 52. 25[illegible]T101

LUR'YE, A. I.

"Review of A.I.Lur'ye's Book 'Some Nonlinear Problems in Automatic Control Theory," A.M.Letov, reviewer.

Avtomat i Telemekh., 13, No.5, pp 610-615, 1952

Favorable review of the book, which is a compendium of papers by Lur'ye on this subject previously published in the periodicals Prikladnaya Matematikakh i Mekhanika and Avtomatika i Telemekhanika.

256T72

LUR'YE, A.I.

MESHCHERSKIY, Ivan Vsevolodovich, 1859-1935 [author]; LUR'YE, A.I. [redaktor].

[Collection of problems in theoretical mechanics] Sbornik zadach po teoreticheskoi mekhanike. Pod.red. A.I.Lur'e. Izd.19., stereotipnoe. Moskva, Gos.izd-vo tekhniko-teoret.lit-ry, 1953. 384 p. (MLRA 6:8)
(Mechanics--Problems, exercises, etc.)

LUR'YE, A. I.

Stability

"Principles of the theory of the stability of movement." G.N. Dukoshin. Reviewed by A.I. Lur'ye. Sov. kniga No. 3, 1953.

Monthly List of Russian Accessions, Library of Congress June 1953. UNCL.

LUR'YE, A. I.

3

USSR

Lur'e, A. I. The stressed state in an elastic cylinder loaded on the lateral surface. Inžen. Sb. 17, 43-58 (1953). (Russian)

The problem described in the above title has a long history and was investigated by many workers. One of the first, Lamé, solved the problem of an infinite cylinder loaded along a line on the lateral surface on its entire length. The author justifies his contribution claiming not only a new method but also some new results. He considers an infinite cylinder loaded normally on the lateral surface in the following ways: (a) continuous constant loads along a line segment of finite length, (b) continuous constant loads along a circumference of a normal section, (c) loads arbitrarily applied. The author deals mainly with case (a). Solutions (displacements in this case) are in form of Fourier integrals which are transformed by contour integration into functions in series form. When the length of the loaded segment increases, solutions approach Lamé solutions. This work provides a convenient means of finding an error when Lamé's method is used as an approximation. At the end the author shows how to apply solution of case (a) to solve case (b), and then how to apply (a) and (b) to solve (c). The author mentions in the preface that in principle his method could be extended to a hollow cylinder but it would not be practical.

T. Leser (Lexington, Ky.).

LUR'YE, A. I.

"Equilibrium of an Elastic Spherical Shell," A.I.Lur'ye, Leningrad, Prik Mat i Mekh, Vol 17 No 3, pp 311-332, 1953

Following the method of Thomson and Tait (Treatise on Natural Philosophy, 1883), who use Cartesian coordinates (Lamé used spherical), and employing vector notation, the author proceeds from the soln of the eqs of elasticity theory in the form proposed by P. F. Papkovich, whose fourth harmonic function (Thomson used only three) in this soln permits one to simplify the behavior of the soln and to decrease the bulk computations. The author obtains the soln for the case where the displacement surfaces are given on a limiting hollow sphere and for the case of external loads. 250T30

LUR'YE, A. I.

PHASE I TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 514 - I

Call No.: AF643366

BOOK

Authors: LOYTSYANSKIY, L. G. and LUR'YE, A. I.

Full Title: COURSE IN THEORETICAL MECHANICS, VOLUME I. STATICS AND KINEMATICS. Fifth revised edition.

Translitereated Title: Kurs teoreticheskoy mekhaniki. T. I - Statika i kinematika

PUBLISHING DATA

Originating Agency: None

Publishing House: State Publishing House of Technical and Theoretical Literature

Date: 1954 No. pp.: 379 No. of copies: 50,000

Editorial Staff: None

PURPOSE: This is a textbook approved by the Ministry of Higher Education of the USSR for institutions of higher learning.

TEXT DATA

Coverage: This is the first volume of the fifth edition of the two-volume Course of Theoretical Mechanics. It was brought up-to-date in conformity with present requirements. Basic conceptions and the history of the development of theoretical mechanics will be found in a 37 page introduction. In this volume problems of statics and kinematics are analyzed. Vectorial algebra was omitted because it forms a part of the program of higher mathematics.

No. of References: 17 in footnotes: 7 Russian, 1846-1950, 10 non-Russian, 1943-1950.

Facilities: None

SOV/124-59-1-830

Translation from: Referativnyy zhurnal. Mekhanika, 1959, Nr 1, p 121 (USSR)

AUTHORS: Lur'ye, A.I., Radtsig, M.A., Krol', A.P., Rozenblyum, V.I.

TITLE: The Development Methods for Calculating Turbine Parts Under the Conditions of Creeping

PERIODICAL: Inform. pis'mo Nr 119, Tsentr. n.-i. kotloturbinnyy in-t. Moscow-Leningrad, Mashgiz, 1953, pp 1-5

ABSTRACT: A short exposition of the development results of calculation methods for the creeping of non-uniformly heated turbine disks of an arbitrary profile and turbine diaphragms is given. The calculation of the unsteady creeping of a turbine disk is based on the variation method proposed by L.M. Kachanov. The distribution of stresses in the state of stationary creeping, necessary for this method, is determined by means of the numerical integration of the system of two equations with respect to two functions, through which the stresses and the deformations in the disk are expressed. To satisfy the boundary conditions it is necessary to integrate the system 2 - 3 times. The calculation is based on the equations of the fluid dynamics. The steady creeping of a turbine diaphragm is schematically considered as a semi-ring of constant thickness, at an arbitrary relation between the

Card 1/2

SOV/125-59-1-830

The Development Methods for Calculating Turbine Parts Under the Conditions of Creeping

creeping rate and the stress. For the determination of the maximum deflection of the diaphragm a very simple method by means of two given graphics is proposed. The effect of the vane deformation can be taken into account, but the calculation appears very difficult.

A.G. Kostyuk

Card 2/2

LUR'YE, A.I.

The Committee on Stalin Prizes (of the Council of Ministers USSR) in the fields of science and inventions announces that the following scientific works, popular scientific books, and textbooks have been submitted for competition for Stalin Prizes for the years 1952 and 1953. (Sovetskaya Kultura, Moscow, No. 22-40, 20 Feb - 3 Apr. 1954)

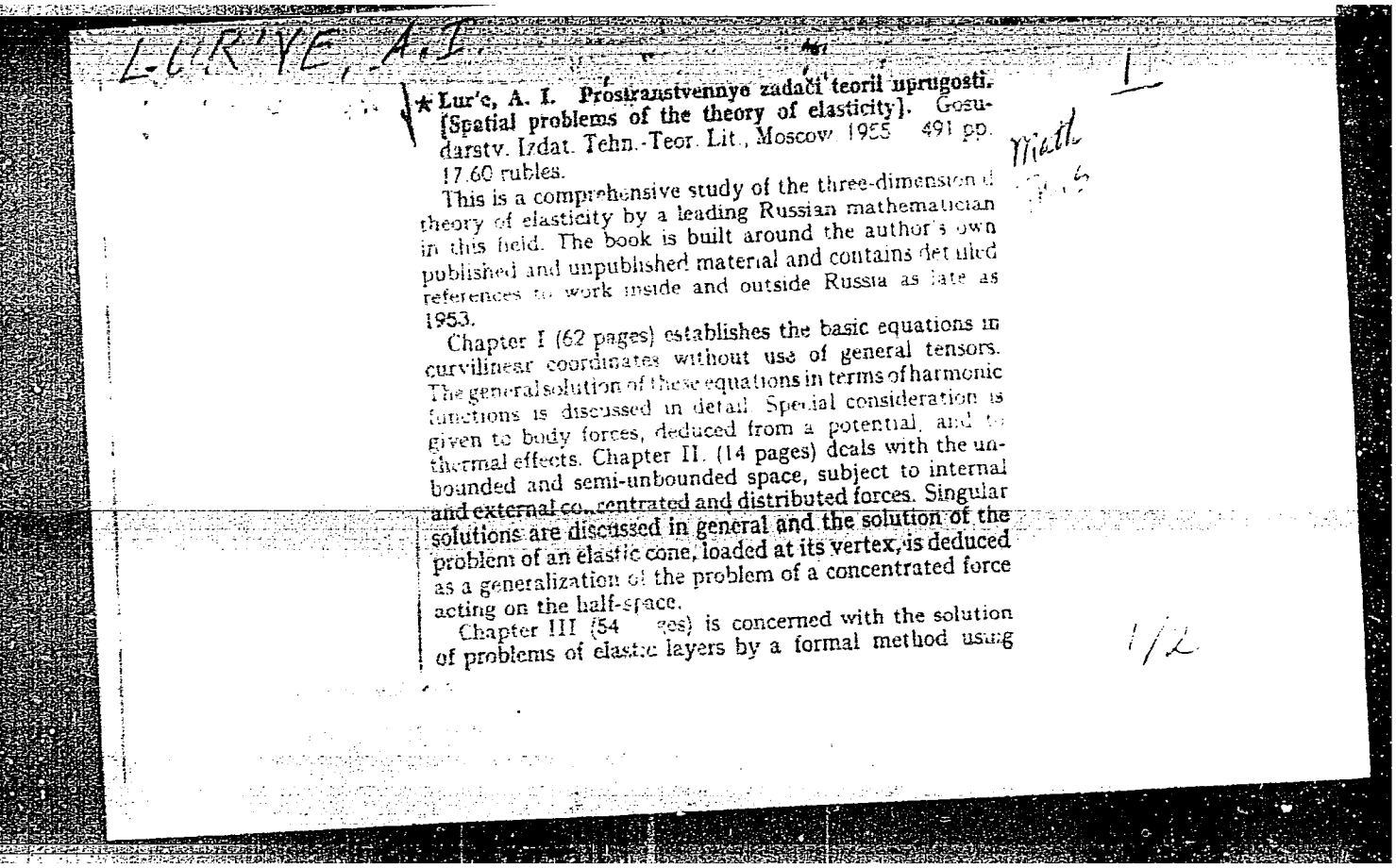
Name	Title of Work	Nominated by
Lur'ye, A. I.	"Certain Nonlinear Problems in the Theory of Automatic Regulation"	Leningrad Polytechnic Institute imeni M. I. Kalinin

SO: W-30604, 7 July 1954

LUR'YE, A.I.

MESHCHERSKIY, Ivan Vsevolodovich, 1859-1935.; LUR'YE, A.I. redaktor

[Collection of problems in theoretical mechanics] Sbornik zadach po teoreticheskoi mekhanike. Pod red. A.I.Lur'e. Izd. 21 Moskva, Gos. izd-vo tekhn.-teoret. lit-ry, 1955. 384 p. (MLRA 8:11)
(Mechanics--Problems, exercises, etc.)



LURYE, A.I.

★ Lur'e, A. I. Prostranstvennye zadači teorii uprugosti. [Spatial problems of the theory of elasticity]. Gosudarstv. Izdat. Tehn.-Teor. Lit., Moscow, 1955. 491 pp. 17.60 rubles.

This is a comprehensive study of the three-dimensional theory of elasticity by a leading Russian mathematician in this field. The book is built around the author's own published and unpublished material and contains detailed references to work inside and outside Russia as late as 1953.

Chapter I (62 pages) establishes the basic equations in curvilinear coordinates without use of general tensors. The general solution of these equations in terms of harmonic functions is discussed in detail. Special consideration is given to body forces, deduced from a potential, and to thermal effects. Chapter II. (14 pages) deals with the unbounded and semi-unbounded space, subject to internal and external concentrated and distributed forces. Singular solutions are discussed in general and the solution of the problem of an elastic cone, loaded at its vertex, is deduced as a generalization of the problem of a concentrated force acting on the half-space.

Chapter III (54 pages) is concerned with the solution of problems of elastic layers by a formal method using

Math

1

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algebraic equations in differential operators. The method is applied to the problems of compression by direct forces on the free surfaces, of bending and of thermal stressing. Chapter IV (51 pages) studies problems of thick plates by the method of the preceding chapter. The solution is obtained in two parts, the "homogeneous" which satisfies the edge conditions and the "non-homogeneous", satisfying the loading conditions on the free faces. The particular cases considered are the circular plate for various edge and loading conditions and thermal stresses due to linear variation of temperature through the plate thickness.

Chapter V (75 pages) deals with the contact problem. Circular and elliptical areas of contact are solved as special cases. Chapter VI studies the deformation of symmetrically loaded spheres, thick spherical shells and the ellipsoidal cavity. Chapter VII (60 pages) deals with the circular cylinder in bending and under loads on its side surface. Chapter VIII (45 pages) returns to the problem of the elastic sphere for more general boundary conditions and solves several particular cases for given surface tractions and displacements.

Each chapter is followed by a survey of the literature relating to the presented results. *I. R. M. Radok.*

2/2

LUR'YE, A.L. (Moskva)

Mathematical theory of statistical control used in industrial processes. Izv.AN SSSR.Otd.tekh. nauk no.2:113-119 F '56. (Mathematical statistics) (Quality control) (MLRA 9:7)

ALUMAE, N.A. (Tallin); LUR'YE, A.I. (Leningrad)

Review of A.L. Gol'denveizer's book ("Theory of elastic thin shells." Reviewed by N.A. Alumae, A.I. Lur'e.). Izv.AN SSSR.Otd.tekh.nauk no.5:171-176 My '56. (MLRA 9:8)
(Elastic plates and shells) (Gol'denveizer. A.L.)

LUR'YE, A.I.

"Theory of elasticity," [in Polish]. M.T. Huber. Reviewed by A.I. Lur'e. Izv. AN SSSR. Otd. tekh. nauk no.6:172-174 Je '56. (MLRA 9:9)

(Elasticity) (Huber, Maksymilian Tytus, 1872-1950)

DZHANELIDZE, G.Yu.; LUR'YE, A.I.; TALITSKIKH, N.A.

Sergei Sergeevich Golushkevich. Izv.AN SSSR.Otd.tekh.nauk no.8:143-144 Ag '56. (Golushkevich, Sergei Sergeevich, 1903-1956) (MLRA 9:9)

HAYASHI, Chihiro; BURDINA, V.I. [translator]; LUR'YE, A.I., red.

[Forced oscillations in nonlinear systems] Vynuzhdennye kolebaniia v nelineinykh sistemakh. Pod red. A.I.Lur'e. Moskva, Izd-vo inostr.lit-ry, 1957. 204 p. Translated from the English. (Oscillations) (MIRA 13:5)

LUR'YE, A. I. (Prof.); LETOV, A. M. (Prof.)

"Theory of Stability of Non-linear Systems of Automatic Regulation,"

paper read at the Session of the Acad. Sci. USSR, on Scientific Problems of Automatic Production, 15-20 October 1956.
Avtomatika i telemekhanika, No. 2, p. 182-192, 1957.

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LUR'YE, A.I.; UFLYAND, Ya.S.

"Fourier's transforms" by I. Sneddon. Usp.mat.nauk 12 no.2(74):252-254 Mr.-Apr '57. (MIRA 10:7)
(Transformations (Mathematics))

LUR'YE, A.I.

40-4-17/24

AUTHOR: LUR'YE, A.I. (Leningrad)

TITLE: On the Theory of Finite Rotations of a Solid Body (O teorii konechnykh povorotov tverdogo tela).

PERIODICAL: Prikladnaya Mat.i Mekh., 1957, Vol.21, Nr 4, pp.571-573 (USSR)

ABSTRACT: Let θ_i denote the rotation of a body with a fixed point by the angle φ_i around an axis determined by the unit vector $\vec{e}_i$ $(i=1,2)$.

Theorem: The result of the rotations θ_1 and θ_2 carried out one after another is equal to the rotation θ_2 and to a following rotation by the angle φ_1 around an axis which arises from the axis of θ_1 by the rotation θ_2.

SUBMITTED: April 1, 1957

AVAILABLE: Library of Congress

CARD 1/1

LUR'YE, A.I.

AUTHOR: Lur'ye, A.I. (Leningrad) 40-21-6-4/18

TITLE: Remarks on Analytical Mechanics (Zametki po analiticheskoy mekhanike)

PERIODICAL: Prikladnaya Matematika i Mekhanika, 1957, Vol 21, Nr 6, pp 759-768 (USSR)

ABSTRACT: In his paper the author presents some not directly connected remarks concerning different questions of analytical mechanics which are usually not or not explicitly enough discussed in the otherwise detailed textbooks on theoretical mechanics. At first he gives a representation of the dissipation function which is valid also for different forms of the friction law. A second short remark concerns the analytic representation of the kinetic energy of acceleration of a body rotating around an axis. In a third remark the author gives investigations for the determination of generalized forces of revolution. By a suitable kind of representation it is possible to determine separately each of the generalized forces of reaction from one equation. The most detailed remark refers to the equation given by Darboux [Ref 3] . With the aid of the complex parameters introduced by Klein and Cailey [Ref 4] it is possible

Card 1/2

to bring the Darboux equation into a particularly simple form. Its solution can be reduced in special cases to the solution of a Riccati differential equation. In special cases even an integration by simple quadratures can be obtained. The author calculates more detailed such a special case which refers to the motion of a quick, symmetric gyroscope around the axis of symmetry. There are 2 tables and 4 references, 1 of which is Soviet, 2 French, and 1 German.

SUBMITTED: June 1, 1957

AVAILABLE: Library of Congress

1. Mechanics-Theory 2. Bodies of revolution-Analysis

LUR'YE, A.I.
p. 2, 3

PHASE I BOOK EXPLOITATION 1076

Leningrad. Politekhnicheskiy institut

Dinamika i prochnost' mashin; (Dynamics and Strength of Machines; Collection of Articles) Moscow, Mashgiz, 1958. (Series: Its: Trudy, No. 192) 234 p. 3,300 copies printed.

Ed.: Lur'ye, A.I., Doctor of Technical Sciences, Professor; Tech. Ed.: Pol'skaya, R.G.; Resp. Ed. of Series: Smirnov, V.A., Doctor of Technical Sciences, Professor; Managing Ed. for Literature on the Design and Operation of Machines (Leningrad Division, Mashgiz): Fetisov, F.I., Engineer.

PURPOSE: This collection of articles is intended for scientific and engineering workers concerned with problems of dynamics and strength of machines.

COVERAGE: The collection contains articles on problems of the theory of elasticity, oscillation, and automatic control.

Card 1/5

TABLE OF CONTENTS:

OSCILLATIONS

Dynamics and Strength of Machines (Cont.) 1076

16. Troitskiy, V.A. Stability of Intermittent-control Systems With Two Pulse Elements 220

AVAILABLE: Library of Congress

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1-27-59

Card 5/5

MESHCHERSKIY, I.V.; LUR'YE, A.I., red.; LEVANTOVSKIY, V.I., red.; YERMAKOVA, Ye.A., tekhn.red.

[Collection of problems in theoretical mechanics] Sbornik zadach po teoreticheskoi mekhanike. Pod red. A.I. Lur'e. Izd. 24. Moskva, Gos. izd-vo fiziko-matematicheskoi lit-ry, 1958. 384 p. (MIRA 12:1)
(Mechanics--Problems, exercises, etc.)

Lur'ye, A.I.

3-58-4-7/34

AUTHOR: Loytsyanskiy, L.G., Professor, Doctor of Physico-Mathematical Sciences, Lur'ye, A.I., Professor, Doctor of Technical Sciences

TITLE: Suggestions Which Deserve Support (Predlozheniya, kotoryye zasluzhivayut podderzhki)

PERIODICAL: Vestnik Vysshey Shkoly, 1958, # 4, p 26 (USSR)

ABSTRACT: With reference to the preceding article, of Professor A.A. Kosmodem'yanskiy, the authors confirm that there is a tendency to cut the general course in theoretical mechanics, especially in the electro-engineering and radio-engineering fields. Though they agree with him in many respects, they still regard Kozmodem'yanskiy's suggestions as being somewhat biased.

ASSOCIATION: Leningradskiy politekhnicheskiy institut imeni M.I. Kalinina (Leningrad Polytechnic Institute imeni M.I. Kalinin)

AVAILABLE: Library of Congress

Card 1/1

MESHCHERSKIY, Ivan Vsevolodovich [deceased;(1859-1935)]; LUR'YE, Anatoliy Isakiyevich, red.

[Collection of problems in theoretical mechanics] Sbornik zadach po teoreticheskoi mekhanike. Izd.25. Moskva, Gos.izd-vo fiziko-matem.lit-ry, 1959. 384 p. (MIRA 13:4)
(Mechanics--Problems, exercises, etc.)

L-uR'YE, A.I.

2) A Ya Boyarskiy - The Differential Equations of Expanded Reproduction
3) L V Kantorovich - Optimal Planning and Economic Indicators
4) A A Konyus - Mathematical Analysis of the Organic Composition of Production
5) N I Vedute - Mathematical Analysis of Rates and Proportions in the National Economy (Primarily in Determining the Economic Efficiency of Capital Investment)
6) B I Plyukhin, N P Nazarov - Price Relationships in Expanded Reproduction
7) L M Dudkin and V S Vaksman - Statistical [sic] and Dynamic Models of a Socialist National Economic Balance in Physical Terms

c. Evening Session - 15 December 1959, 1600 hours
II. The Theory of Linear Programming

1) G S Rubinshtein - Review of Methods for the Solution of Linear Programming Problems
2) A L Lur'ye - Algorithmic Solutions of Transport Problems Through Approximation by Means of Hypothetically Optimal Plans
3) Ya P Gorchuk - The Algebra of Linear Programming
4) B V Kishel'shteyn - Recommendation for a Method of Re-computing Matrices of Total Input Coefficients under Conditions of Changing Technology.
5) Z Chetyrekin - A Practical Interpretation of Kantorovich's Controlling Multipliers
6) Zitov and Barsov - Linear Programming Methods and Material Supply

d. Morning Session - 16 December 1959, 1000 hours
III. Economic Models and Dynamic Programming

1) V V Novozhilov - Mathematical Models of the National Economy in Bourgeois Economics and a Critique Thereof
2) B N Mikhalevskiy - Mathematical Methods of Determining the Maximum Efficiency of Capital Investment
3) V V Shlyapentokh - Concerning the Economic Cycle Models and Dynamic Economic Models of Bourgeois Econometricians
4) V V Trigubenko - Problems in the Application of Dynamic Programming in Economic Research Abroad
5) L Gur'kov - Single-Product Economic Models and the Analysis of Certain Economic Indicators
6) V I Romanovskiy - The Dynamic Programming Method and Its Use in Economics
7) D I Oparin - The Unfolding (stvornaya) Matrix as a Model for the Application of Mathematical Methods in Long-Term Economic Planning

e. Evening Session - 16 December 1959, 1600 hours
IV. The Transportation Problem

1) D I Volovoy - Finding the Most Suitable Assignment of Various Types of Fleet Vessels to Lines

2) A M Faynstil'berg - Extremital Methods in Economic Research on the Optimum Spatial Distribution of Projects

4) A P Aleksandrov, A L Lur'ye, [illegible], and [illegible] - "First Experiences in the Application of Electronic Computers for a Solution of the Haulage Rationalization Problem.

Report submitted at the Soviet Conference on Problems in the Application of Mathematical Methods in Economic Research, Leningrad, 15-21 January 1960.

MUSHTARI, Kh.M., red.; ALUMYAE, N.A., red.; BOLOTIN, V.V., red.; VOL'MIR, A.S., red.; GANIYEV, N.S., red.; GOL'DENVEYZER, A.L., red.; ISANBAYEVA, F.S., red.; KIL'CHEVSKIY, N.A., red.; KORNISHIN, M.S., red.; LUR'YE, A.I., red.; SAVIN, G.N., red.; SACHENKOV, A.V., red.; SVIRSKIY, I.V., red.; SURKIN, R.G., red.; FILIPPOV, A.P., red.; ALEKSAGIN, V.I., red.; SEMENOV, Yu.P., tekhn. red.

[Proceedings of the Conference on the Theory of Plates and Shells] Trudy Konferentsii po teorii plastin i obolochek, Kazan', 1960. Kazan', Akad. nauk SSSR, Kazanskii filial, 1960. 426 p. (MIRA 15:7)

1. Konferentsiya po teorii plastin i obolochek, Kazan', 1960. 2. Moskovskiy energeticheskiy institut (for Bolotin). 3. Kazanskiy khimiko-tekhnologicheskiy institut (for Ganiyev). 4. Institut mekhaniki Akademii nauk USSR (for Kil'chevskiy). 5. Kazanskiy gosudarstvennyy universitet (for Sachenkov). 6. Kazanskiy filial Akademii nauk SSSR (for Svirskiy).
(Elastic plates and shells)

26498
S/044/61/000/004/009/033
C111/C222

16.8000 (103, 1121, 1344)

AUTHORS: Lur'ye, A.I. and Rozenvasser, Ye.N.

TITLE: On methods for constructing the Lyapunov function in the theory of non-linear control systems

PERIODICAL: Referativnyy zhurnal. Matematika, no. 4, 1961, 39, abstract 4 B 204. (Mezhdunar. federatsiya po avtomat. upr. 1-y Mezhdunar. kongress po avtomat. upr. M., AN SSSR, 1960, 12 p.)

TEXT: The paper contains a survey of the methods for constructing the Lyapunov functions for systems of direct controls of the kind

$$x_k = \sum_{\alpha=1}^{n} b_{k\alpha} x_\alpha + h_k f(\sigma) \quad , \quad k = 1,\ldots,n \quad , \quad \sigma = \sum_{s=1}^{n} j_s x_s \quad ,$$

where $b_{k\alpha}$, h_k , j_s are constants, $f(0) = 0$, $c_1 \sigma^2 < \sigma f(\sigma) < c_2 \sigma^2$. The authors consider also systems of mediate controls, i.e. systems

Card 1/2

S/044/61/000/004/009/033
C111/C222

On methods for constructing ...

$$\dot{x}_k = \sum_{\alpha=1}^{n} b_{k\alpha} x_\alpha + n_k \xi$$

$$\dot{\xi} = f(\sigma) , \quad \sigma = \sum_{s=1}^{n} j_s x_s - r\xi .$$

The main object is the method for the investigation of the absolute stability due to A.I. Lur'ye. The authors discuss the role and meaning of this method from the point of view of the most recent publications ; they investigate the possibilities of a further development ; they point to the most essential problems on which the further development depends. A survey of the papers devoted to this method is given. A part of the paper concerns papers in which simplified criteria of stability are obtained. It is pointed out that the problem of A.I. Lur'ye sometimes can be applied to the investigation of the stability of instationary motions. There is a bibliography with 20 titles.

[Abstracter's note : Complete translation.]

Card 2/2

LUR'YE, A.I.

Equations of perturbed motion in Kepler's problem. Isk.sput. Zem. no.4:82-85 '60. (MIRA 13:5)
(Perturbation)

16.7000

77983
SOV/40-24-1-11/28

AUTHORS: Dzhanelidze, G. Yu., Lur'ye, A. I. (Leningrad)

TITLE: Application of Integral and Variational Principles of Mechanics to Vibration Problems

PERIODICAL: Prikladnaya matematika i mekhanika, 1960, Vol 24, Nr 1, pp 80-87 (USSR)

ABSTRACT: Variational and integral principles are used to obtain a condition for determining the frequencies and form of the vibrations of an elastic system. In this, the authors apply the properties of neighboring curves, focusing at points along the direct curve (the solution of the Hamilton equations). It is shown that a modification of the Hamilton principle leads to a study of the extrema of a certain functional without giving the character of the extremum. This, the authors note, has to be done on the basis of an independent investigation. They first show that the Hamilton action:

Card 1/5

$$S = \int_{t_0}^{t_1} L dt \qquad (2.4)$$

assumes a minimum when taken along a path which is a solution of the Hamilton equations:

$$\dot{q}_s = \frac{\partial H}{\partial p_s}, \quad \dot{p}_s = -\frac{\partial H}{\partial q_s} \quad (s = 1, \ldots, n) \qquad (1.5)$$

Here L is the Lagrangian, and p_s and q_s are the generalized momenta and coordinates of the system which is assumed to be conservative with holonomic constraints independent of time. It is assumed that a first time t_1^* exists after t_o for which a certain determinant $\Delta(t)$ vanishes. This implies the existence of a solution of the system of equations for the unknown coefficients which arise in representing a solution of the variational Hamilton

equations in terms of a particular solution of the variational equations. This in turn implies the existence of a family of isochronous curves which emanate from the initial position $q_s(t_o)$ on the direct curve and intersect the direct curve at $q_s(t_1^*)$. On all of these curves, the action up to terms of second order, inclusively, is the same. However, the non-vanishing of $\Delta(t)$ for $t_o < t < t_1^*$ and the positive-definiteness of the quadratic form:

$$\delta^2 T' = \frac{1}{2} \sum_{s=1}^{n} \sum_{k=1}^{n} \frac{\partial^2 H}{\partial p_s \partial p_k} u_s u_k \qquad (1.3)$$

is then shown to guarantee that the second variation $\delta^2 S$ for any neighboring path starting from the initial position $q_s(t_o)$ is positive and, hence, that the action is a minimum on the direct path. Here, $p_s + u_s$

Card 3/5

are the momenta for infinitely close motions. When the position $q_s(t_1)$ is attained after passing through $q_s(t_1^*)$, the action will no longer be a minimum. This is applied to the small vibrations about equilibrium of a conserva-system. A formula for the focusing position $q_s(t_1^*)$ is obtained using an explicit solution $q_s(t)$, $p_s(t)$, and corresponding $\Delta(t)$.. The closest t_1^* turns out to be the semiperiod of the principle vibration of greatest frequency; the Hamilton principle holds only in the sense of stationary value. It is then shown that the relation:

$$\delta S = \frac{\pi}{\omega} \delta (\omega^2 \Gamma - U) = 0 \qquad (4.4)$$

cannot be justified by the usual Hamilton principle as a variational principle for the frequencies ω and form of the elastic vibrations. Instead, the authors use the integral principle:

$$\int_{t_0}^{t_1} \delta L dt = 0 \qquad (4.5)$$

which follows directly from the general equations of motion of dynamics, to justify (4.4) as a variational principle for the eigenvalues. Here T and U are quadratic forms obtained from the kinetic and potential energies (for a finite number of degrees of freedom) by replacing q_s and $\dot{q}_s$ by the constants C_s which appear in the equation for the direct path:

$$q_s = C_s \sin \omega t \qquad (s = 1, \ldots, n) \qquad (4.2)$$

There are 9 references, 3 Soviet, 3 French, 3 German.

SUBMITTED: November 20, 1959

MESHCHERSKIY, Ivan Vsevolodovich; LUR'YE, A.I., red.; LEVANTOVSKIY, V.I., red.; BRUDNO, K.F., tekhn. red.

[Collected problems in theoretical mechanics] Sbornik zadach po teoreticheskoi mekhanike. Pod red. A.I.Lur'e. Izd.27. Moskva, Gos. izd-vo fiziko-matem. lit-ry, 1961. 384 p. (MIRA 15:2)
(Mechanics, Analytic—Problems, exercises, etc.)

LUR'YE, A.I.

LAVRENT'YEV, M.A., otv.red.; MIKHAYLOV, G.K., red.; BITSADZE, A.V., red.; VEKUA, I.N., red.; DZHANELIDZE, G.Yu., red.; LUR'YE, A.I., red.; MANDZHAVIDZE, G.F., red.; MIKHAYLOV, G.K., red.; SEDOV, L.I., red.; SOBOLEV, S.L., red.; SOKOLOVSKIY, V.V., red.; KHRISTIANOVICH, S.A., red.; SHERMAN, D.I., red.; RYVKIN, A.Z., red.izd-va; VOLKOVA, V.V., tekhn.red.

[Problems in the mechanics of solids] Problemy mekhaniki sploshnoi sredy; k semidesiatiletiiu akademika N.I.Muskhelishvili. Moskva, 1961. 577 p. (MIRA 14:3)

1. Akademiya nauk SSSR.
(Mechanics, Analytic) (Elastic solids)

Lur'ye, A.I.

PHASE I BOOK EXPLOITATION SOV/6201

Vsesoyuznyy s"yezd po teoreticheskoy i prikladnoy mekhanike. 1st, Moscow, 1960.

Trudy Vsesoyuznogo s"yezda po teoreticheskoy i prikladnoy mekhanike, 27 yanvarya -- 3 fevralya 1960 g. Obzornyye doklady (Transactions of the All-Union Congress on Theoretical and Applied Mechanics, 27 January to 3 February 1960. Summary Reports). Moscow, Izd-vo AN SSSR, 1962.
467 p. 3000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Natsional'nyy komitet SSSR po teoreticheskoy i prikladnoy mekhanike.

Editorial Board: L. I. Sedov, Chairman; V. V. Sokolovskiy, Deputy Chairman; G. S. Shapiro, Scientific Secretary; G. Yu. Dzhanelidze, S. V. Kalinin, L. G. Loytsyanskiy, A. I. Lur'ye, G. K. Mikhaylov, G. I. Petrov, and V. V. Rumyantsev; Resp. Ed.: L. I. Sedov; Ed. of Publishing House: A. G. Chakhirev; Tech. Ed.: R. A. Zamarayeva.

Card 1/ 6

(25)

PURPOSE: This book is intended for scientific and engineering personnel who are interested in recent work in theoretical and applied mechanics.

COVERAGE: The articles included in these transactions are arranged by general subject matter under the following heads: general and applied mechanics (5 papers), fluid mechanics (10 papers), and the mechanics of rigid bodies (8 papers). Besides the organizational personnel of the congress, no personalities are mentioned. Six of the papers in the present collection have no references; the remaining 17 contain approximately 1400 references in Russian, Ukrainian, English, German, Czechoslovak, Rumanian, French, Italian, and Dutch.

TABLE OF CONTENTS:

SECTION I. GENERAL AND APPLIED MECHANICS

31572
S/124/61/000/011/003/046
D237/D305

24.4100 1057, 1327, 1109, 1502

AUTHOR: Lur'ye, A.I.

TITLE: Some problems of rigid body dynamics

PERIODICAL: Referativnyy zhurnal, Mekhanika, no. 11, 1961, 11, abstract 11A95. (Tr. Leningr. politekhn. in-ta 1960, no.210, 7 - 22)

TEXT: Equations of motion of a system of rigid bodies, one of which is "supporting" and the remaining ones "supported", are obtained in the most general form. The motion of a "supporting" body in an inertial axes system is given in terms of vectors of linear initial velocity, associated axes and angular velocity. The motion of each "supported" body is expressed with reference to axes fixed in the "supporting" body in terms of vectors of respective linear velocity of the origin of the axes of the "supported" body and its angular velocity. Examples are given illustrating the application of the derived equations. In two cases, the author following Robertson, obtains the formulae for determining the perturbing moment due

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Some problems of rigid body dynamics

to the motion of a body enclosed in a sputnik model, and translated to the shell of that model. In the third example, derived equations are applied to a stabilizing system containing gyroscopes which was considered earlier by A.Yu. Ishlinsky. [Abstractor's note: Complete translation].

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LURYE, A. I. and AYZERMAN, M. A.

"Methods for construction of periodic motions in piecewise-linear systems."

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

Politechnical Institute, Leningrad

PHASE I BOOK EXPLOITATION SOV/5768

Lur'ye, Anatoliy Isaakovich

Analiticheskaya mekhanika (Analytical Mechanics) Moscow, Fizmatgiz, 1961. 824 p. 18,000 copies printed.

Ed.: D.R. Merkin; Tech. Ed.: K.F. Brudno.

PURPOSE: This book is intended for students at technical universities, physicists, and engineers concerned with problems in analytical mechanics.

COVERAGE: The book covers much of the material traditionally taught in courses on analytical mechanics (general equations of motion of holonomic and nonholonomic systems, variational principles, the theory of canonical transformations, canonical equations with the theory of their integration [theorem of Hamilton-Jacobi], integral invariants, the theory of the last factor, etc.). Particular attention is given to topics having close connection with engineering problems. The reader is assumed to be familiar with the basic laws of mechanics. The book stresses the application of analytical mechanics to real problems; to this

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end considerable attention is given to methods of introducing generalized coordinates, the theory of finite rotations, methods of calculating kinetic energy and energy of accelerations, the potential energy of forces of various character, and the consideration of drag forces. Following the introductory chapters, the book considers methods for setting up differential equations of motion of holonomic and nonholonomic systems in various forms, wherein questions of their interrelationship are discussed. Detailed consideration is given to problems of determining the reactions of constraints and to some problems of analytical statics. The book also considers geometrically the motions of a material system as the motion of a characteristic point in a Riemann space. This material is used subsequently in problems of perturbation theory. A special chapter is devoted to the dynamics of relative motion to which belong many applied problems. In addition, the book considers canonical equations, canonical transformations, and problems of integration. Considerable space is given to the perturbation theory and its various applications. The last chapter is devoted to the perturbation theory Hamilton-Ostrogradskiy, the principle of least work of Lagrange, and the theory of perturbation of trajectories. General methods are explained by examples. These include the problem of motion of a solid body on a moving base, the motion of a solid body with a cavity filled by a fluid, the problem of motion of a roc

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the application of the Hamilton-Ostrogradskiy principle to systems with distributed masses, etc. Specifically considered are problems connected with the perturbed motion of an artificial earth satellite. To assist the reader, the book summarizes the most important aspects of the theory of matrices and tensor calculation. Part of the book is based on lectures on analytical mechanics and the theory of vibrations given by the author for more than 20 years to mechanical specialists of the Physics and Mechanics Department of the Leningrad Polytechnic Institute imeni M.I. Kalinin. Although the book is not coordinated with the official program requirements and is not intended as a textbook for schools of higher learning, the author feels that it will be of use to students and to scientific workers in many fields of engineering. The author thanks Professor D. R. Merkin, A.K. Gibyanskaya, and K.A. Lur'ye. References appear in footnotes to the text.

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AUTHORS: Lur'ye, A. I., and Rosenvasser, Ye. N. (USSR)

TITLE: On methods of constructing the Lyapunov function in the theory of nonlinear control systems

SOURCE: International Federation of Automatic Control. 1st Congress, Moscow, 1960. Teoriya nepreryvnykh sistem. Spetsial'nyye matematicheskiye problemy. Moscow, Izd-vo AN SSSR, 1961. Trudy, v. 1, 709-722

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TEXT: A control system is considered, described by a system of equations of type

$$\left.\begin{aligned} \dot{x}_k &= \sum_{\alpha=1}^{n} b_{k\alpha} x_\alpha + h_k f(\sigma), \quad k = 1,\dots,n \\ \sigma &= \sum_{s=1}^{n} j_s x_s \end{aligned}\right\} \qquad (1)$$

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where b, h and j are constants. It is assumed that system (1) has a single equilibrium position and that all the conditions of Lyapunov's second method apply. In this case, system (1) is called a direct-control system. The system of (n+1)-order:

$$\left.\begin{aligned} \dot{x}_k &= \sum_{\alpha=1}^{n} b_{k\alpha} x_\alpha + n_k \xi \quad , \quad k = 1,\ldots,n \quad , \\ \dot{\xi} &= f(\sigma) \quad , \quad \sigma = \sum_{s=1}^{n} j_s x_s - r\xi \end{aligned}\right\} \qquad (4)$$

is called an indirect-control system. System (1) is called absolutely stable in the interval (c_1, c_2) if its equilibrium position is asymptotically stable for any initial deviations and any function $f(\sigma)$ (which satisfies certain conditions). Together with (1), the linearized system

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$$\left.\begin{aligned} \dot{x}_k &= \sum_{\alpha=1}^{n} b_{k\alpha} x_\alpha + h_k c\sigma \quad , \quad k = 1,\dots,n \quad , \\ \sigma &= \sum_{s=1}^{n} j_s x_s \end{aligned}\right\} \qquad (5)$$

is considered. The Lyapunov function

$$V = \Phi + \beta \int_0^\sigma f(\sigma)\, d\sigma \qquad (6)$$

has to be constructed, where

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$$\Phi = \frac{1}{2} \sum_{k=1}^{n} \sum_{\alpha=1}^{n} p_{k\alpha} x_k x_\alpha \qquad (7)$$

is a quadratic form and β = const.; function (6) should be of opposite sign to its derivative

$$\dot{V} = \sum_{k=1}^{n} \frac{\partial V}{\partial x_k} \dot{x}_k \quad . \qquad (8)$$

The method is based on the following steps: (a) Transformation of (1) or (4) to canonical form; (b) the use of a special type of quadratic form as (7), so that the sufficient conditions of stability reduce to the conditions of solvability of a system of quadratic equations; (c) transformation of the obtained system of quadratic equations to a form which depends only on the coefficients of system (1). This transformed system

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is called resolving system. The canonical form of (1) is

$$\left.\begin{aligned} \dot{z}_\rho &= \lambda_\rho z_\rho + f(\sigma) \quad , \quad \rho = 1,\dots,n \quad ; \\ \dot{\sigma} &= \sum_{\rho=1}^{n} \gamma(\lambda_\rho) z_\rho \quad , \end{aligned}\right\} \tag{9}$$

where λ are the roots of the characteristic equation of the linear part of (1). The canonical form of (4) is

$$\left.\begin{aligned} \dot{z}_\rho &= \lambda_\rho z_\rho + f(\sigma) \quad , \quad \rho = 1,\dots,n \quad ; \\ \dot{\sigma} &= \sum_{\rho=1}^{n} \beta(\lambda_\rho) z_\rho - rf(\sigma) \quad . \end{aligned}\right\} \tag{12}$$

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As (7), one takes

$$\Phi = \sum_{i=1}^{n} \sum_{k=1}^{n} \frac{a_i a_k z_i z_k}{\lambda_i + \lambda_k} \quad , \tag{13}$$

which depends on the n numbers a_k. The main results of an earlier work by Lur'ye relate to the interval $(0,\infty)$, i.e., the nonlinear function is determined by

$$\sigma f(\sigma) > 0 \quad . \tag{14}$$

The sufficient stability-conditions of (9) are formulated as the existence conditions of at least one set of numbers

$$\{a\}_m^n$$

which satisfy

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$$2a_\rho \sum_{\alpha=1}^{n} \frac{a_\alpha}{\lambda_\rho + \lambda_\alpha} = \gamma(\lambda_\rho) \quad , \quad \rho = 1,\ldots,n \quad . \qquad (15)$$

For (12), the corresponding system is

$$-2a_\rho\sqrt{r} + 2a_\rho \sum_{\alpha=1}^{n} \frac{a_\alpha}{\lambda_\rho + \lambda_\alpha} = \beta(\lambda_\rho) \quad , \quad \rho = 1,\ldots,n \quad . \qquad (16)$$

The basic results are formulated as follows: (a) If Re $\lambda_\rho < 0$, and $\lambda_i \neq \lambda_\rho$ for $i \neq \rho$, then system (1) is stable in $(0,\infty)$ if numbers $\{a\}_m^n$ exist, so that

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$$-2a_\rho \sqrt{-\beta \sum_{s=1}^{n} j_s h_s} + 2a_\rho \sum_{\alpha=1}^{n} \frac{a_\alpha}{\lambda_\rho + \lambda_\alpha} = a\gamma_\rho + \beta\gamma_\rho\lambda_\rho \ , \quad \rho = 1,\ldots,n \ . \qquad (18)$$

(b) If Re $\lambda_\rho < 0$ and (18) is expressed by the coefficients of (1), then (18) yields the solution to the problem even if $D(\lambda) = 0$ has roots of any multiplicity. (c) Under certain conditions, (1) is absolutely stable in the region of solvability of (18). It can be shown that the above systems of quadratic equations can always be brought to the form of (15) or (16). This makes it possible to use a single method of solution for the stability problem, irrespective of the limits of the interval. Simplified stability criteria: As the analysis of resolving systems of quadratic equations is cumbersome for large n, other criteria are sought for determining the Lyapunov function in system (1). One of these criteria

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involves the form

$$W(c^*,c) = \sum_{k=1}^{n} \sum_{\alpha=1}^{n} \frac{\partial U(c^*)}{\partial x_k} b_{k\alpha} x_\alpha + c\sigma \sum_{k=1}^{n} h_k \frac{\partial U(c^*)}{\partial x_k}, \quad (21)$$

which is negative definite in a certain interval $c_1 < c < c_2$. Another method (by V. A. Pliss), consists in reducing the problem of a Lyapunov function of type (6) for system (1) to that of the function

$$V_1 = \frac{1}{2} \sum_{k=1}^{n} \sum_{\alpha=1}^{n} p_{k\alpha} x_k x_\alpha + \frac{1}{2} c\sigma^2 \quad (23)$$

for the linearized system (5). The necessary and sufficient conditions for this method are obtained. Further, stability criteria are obtained for non-stationary systems. These conditions involve the quadratic

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