PUGACHEV, V. S.

USSR/Mathematics - Probability, Stochastic Functions — Sep/Oct 53

"General Theory of the Correlation of Stochastic Functions," V. S. Pugachev

Iz Ak Nauk SSSR, Ser Mat, Vol 17, No 5, pp 401-420

The author expounds certain general results of the methods for investigating stochastic functions, which he developed in 1947-1948 ("Fundamentals of the General Theory of Chance Functions," Trudy Akademii Art. Nauk [Works of the Academy of Artillery Sciences], 1952). Having in mind the creation of an applied theory sufficiently simple

274T68

and convenient in practical applications, the author limits himself mainly to a study of those properties of stochastic functions which are characterized by moments of the first and second order - the mathematical expectations and the correlational functions. Presented by Acad A. N. Kolmogorov, 6 Jan 53.

124-58-6-6330

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 6, p 7 (USSR)

AUTHOR: Pugachev, V. S.

TITLE: The General Theory of Random Functions and its Application to the Theory of Automatic Control (Obshchaya teoriya sluchaynykh funktsiy i yeye primeneniye v teorii avtomaticheskogo reguliro-vaniya)

PERIODICAL: Tr. 2-go Vses. soveshchaniya po teorii avtomaticheskogo regulirovaniya. Vol 2. Moscow-Leningrad Izd-vo AN SSSR, 1955, pp 403-424

ABSTRACT: This survey, founded mainly on material from previous writings of the author (Izv. AN SSSR. Ser. matem., 1953, Vol 17, Nr 5, pp 401-420, et al.), touches upon many of the points covered in his subsequent monograph (Teoriya sluchaynykh funktsiy i yeye primeneniye k zadacham avtomaticheskogo upravleniya [Theory of Random Functions and its Application to the Problems of Automatic Control]. Moscow, Gostekhizdat, 1957). The survey contains the following sections: 1) the moments of random functions (determination and characteristic properties of the moments of different orders, the steady state in the

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The General Theory of Random Functions and its Application (cont.)

narrow and broad sense); 2) the theory of canonical expansions of random functions (the different forms of canonical expansions, including spectrum analysis in the case of stationary functions); 3) vectorial random functions (determination and canonical expansion of such functions), 4) the theory of the linear transformations of random functions (formulae for their moments, also canonical expansions of a random function obtained from an initial random function with known moments and known canonical expansions by means of a linear transformation); 5) the theory of nonlinear transformations of random functions (data concerning the moments and canonical expansions of a random function obtained with the aid of a nonlinear transformation); 6) a statistical investigation of random systems (application of the theory of linear transformations of random functions to the linear transformations achieved with linear automatic-control systems), 7) approximate statistical investigation of nonlinear systems by means of the linearization method (application of the method of canonical expansions to systems described by nonlinear equations, with subsequent linearization) 8) a statistical investigation of nonlinear systems (application of the methods of Section 5 to nonlinear automatic-control systems) 9) design-engineering problems in automatic-control system design (a short survey of the work that has been done in this field) 10) outlook for the development of statistical methods in

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124-58-6-6330

The General Theory of Random Functions and its Application (cont.)

the theory of automatic control (an enumeration of problems requiring further development). Bibliography: 17 references.

A. M. Yaglom

1. Control systems--Automation
2. Random functions--Theory
3. Mathematics--Applications

Card 3/3

PUGACHEV, V. (Prof-Eng. D Major General) and MARISOV, V. (Lecturer,Bach. Tech. Sci.,Engr.)

"Guided Missiles," Krasnaya Zvezda, later reprinted in Skrzydlata Polska (Winged Poland), No.17, pp 8 and 9, 1955

Translation of an extensive summary D 311976, 1 Sep 55

The authors describe various kinds of guided missiles, but fail to supply any details or data. Anti-aircraft guided missiles are briefly mentioned and there is no word about two-stage missiles or air-to-air missiles. No particular missile is specified except the B-61 "Matador".

Transactions of the Third All-union Mathematical Congress, Moscow, Jun-Jul '56, Trudy '56, V. 1, Sect. Rpts., Izdatel'stvo AN SSSR, Moscow, 1956, 237 pp.

Pugachev, V. S. (Moscow). On the Transformation of Entropy of Random Function During the Linear Transformation of Random Functions. 125-127

[illegible], I. S. (Prof.)

"Condition and Problems of Development of Random Functions and Probability Methods of the Theory of Automatic Control,"

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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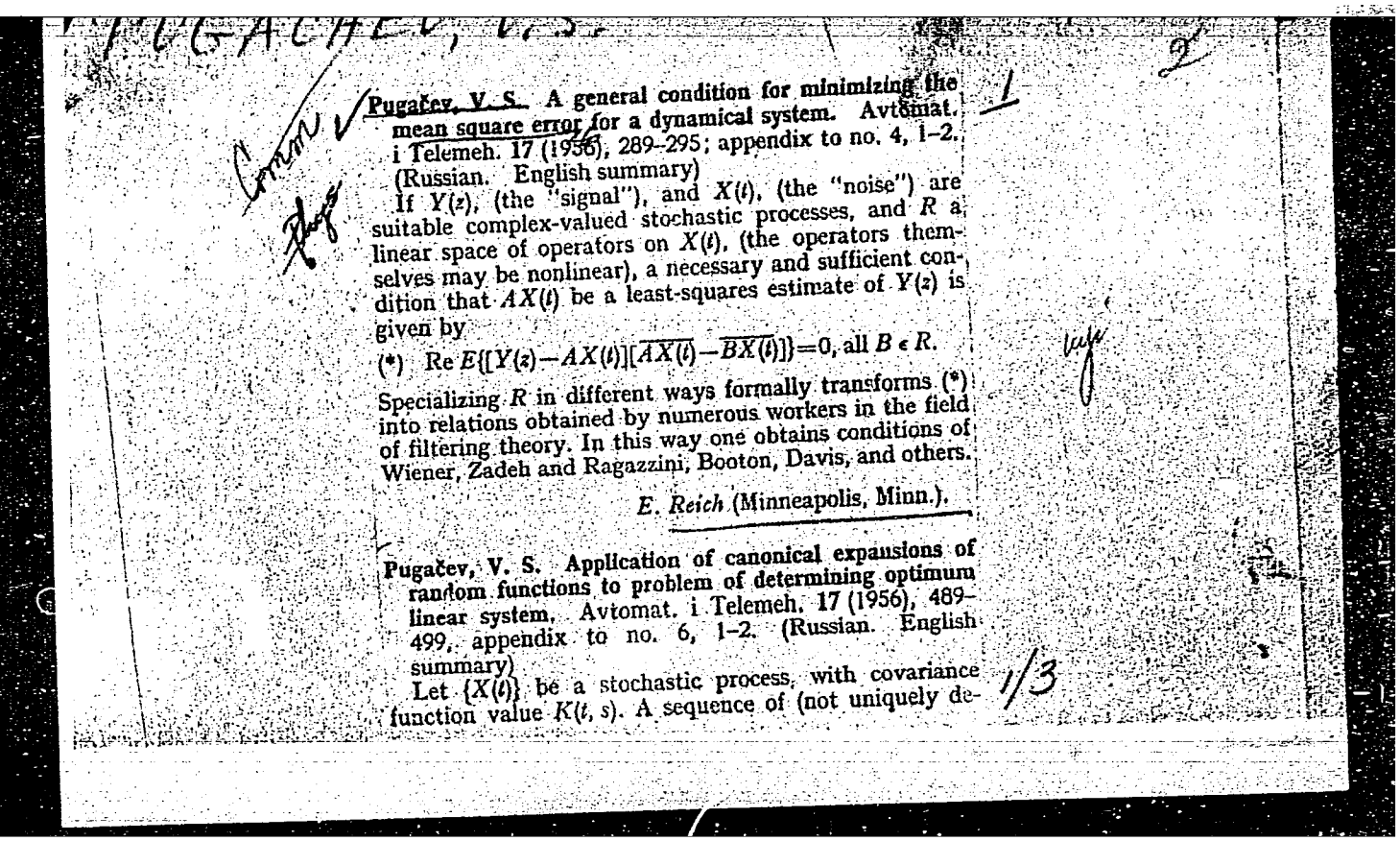
PUGACHEV, V., Maj. Gen. Eng-Tech. Service, Dr. Tech. Sci., Prof; MARIOV, V., Eng. Maj. Cand. Tech. Sci., Docent

"Installation and Methods of Application of Guided Missiles," from the book, Modern Military Technology, 1956, page 26

Translation 1114505



Pugačev, V. S. A general condition for minimizing the mean square error for a dynamical system. Avtomat. i Telemeh. 17 (1956), 289–295; appendix to no. 4, 1–2. (Russian. English summary)

If $Y(z)$, (the "signal"), and $X(t)$, (the "noise") are suitable complex-valued stochastic processes, and R a linear space of operators on $X(t)$, (the operators themselves may be nonlinear), a necessary and sufficient condition that $AX(t)$ be a least-squares estimate of $Y(z)$ is given by

(*) $\operatorname{Re} E\{[Y(z)-AX(t)][\overline{AX(t)}-\overline{BX(t)}]\}=0$, all $B \in R$.

Specializing R in different ways formally transforms (*) into relations obtained by numerous workers in the field of filtering theory. In this way one obtains conditions of Wiener, Zadeh and Ragazzini, Booton, Davis, and others.

E. Reich (Minneapolis, Minn.).

Pugačev, V. S. Application of canonical expansions of random functions to problem of determining optimum linear system. Avtomat. i Telemeh. 17 (1956), 489–499, appendix to no. 6, 1–2. (Russian. English summary)

Let $\{X(t)\}$ be a stochastic process, with covariance function value $K(t, s)$. A sequence of (not uniquely de-

termined) linear functionals, $\{\Omega^{(\nu)}\}$ is found, for which

$$\overline{\Omega}_t^{(\nu)}[\Omega_s^{(\mu)}K(t, s)]=\Delta_\mu\delta_{\mu\nu},$$

and then the process is written in the form $X(t)=M\{X(t)\}+\sum V_\mu u_\mu(t)$, where $u_\mu\Delta_\mu$ is the function in the above bracket, and where $V_\mu=\overline{\Omega}^{(\mu)}[X(t)-M\{X(t)\}]$. Let $f_1, \cdots, f_N, g_1, \cdots, g_N$ be specified functions, and let $U_1, \cdots, U_N$ be random variables with zero expectations, orthogonal to the $X(t)$ process as well as to a given $Y(z)$ process. The author gives a formal solution of the problem of best linear least squares approximation to $Y(z)+\sum U_r g_r(z)$ by means of the family of random variables $\hat{X}(t)=X(t)+\sum U_r f_r(t)$. The solution has the form $[\sum x_\nu(z)\overline{\Omega}^{(\nu)}]\hat{X}(t)$. These results generalize earlier results by the author [Sb. Naučnyh Trudov VVIA Žukov. no. 1 (1954); see also the paper reviewed above]. *J. L. Doob.*

Pugačev, V. S. Possible general solution of the problem of determining optimum dynamical system. Avtomat. i Telemeh. 17 (1956), 585–589, appendix to no. 7, 1–2. (Russian. English summary)

In the problem of the preceding review, if $N=0$, and if the random variables involved are jointly normal, in

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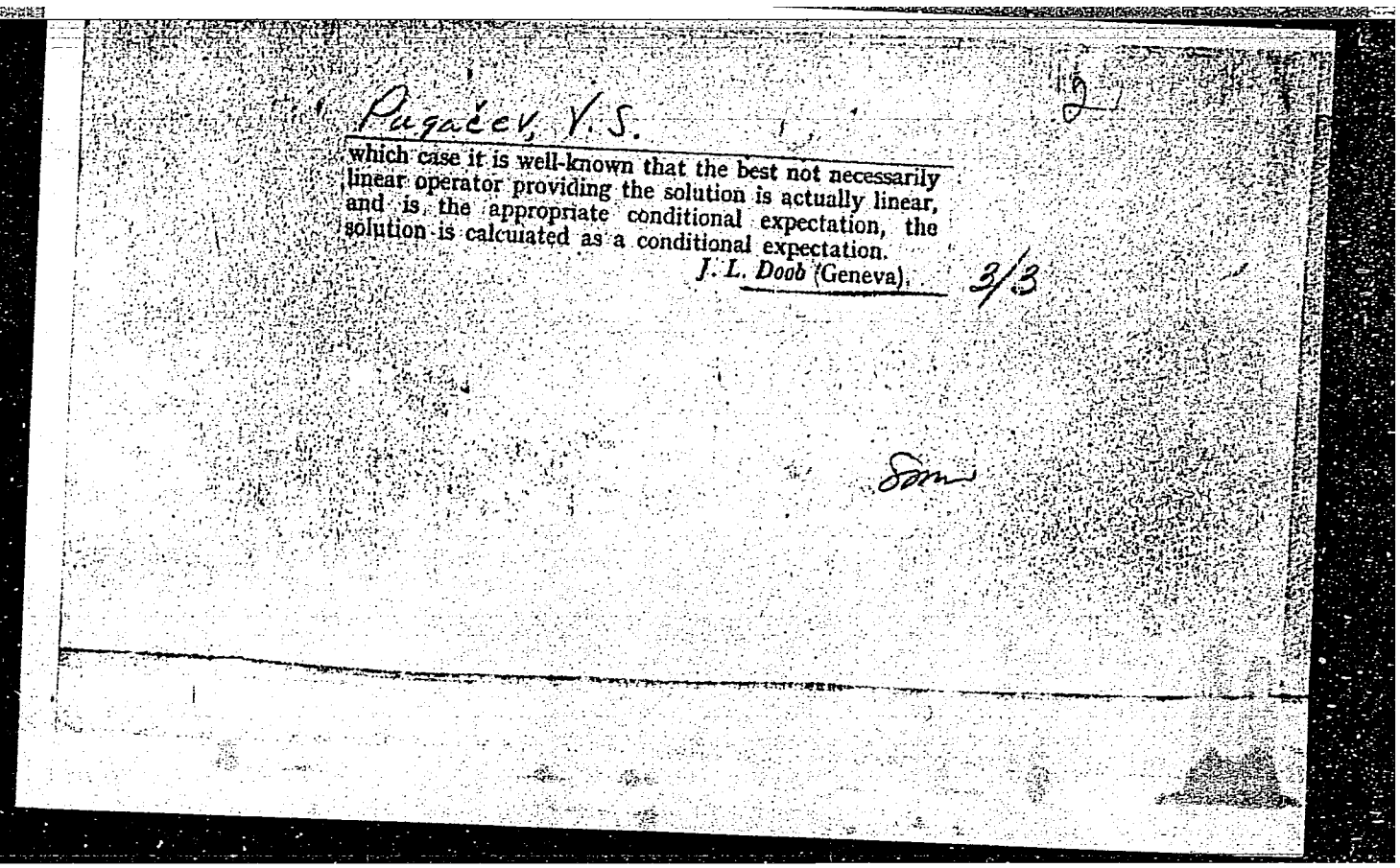

Pugačev, V. S.

which case it is well-known that the best not necessarily linear operator providing the solution is actually linear, and is the appropriate conditional expectation, the solution is calcuated as a conditional expectation.

J. L. Doob (Geneva).

USSR/General Section A

Abs Jour : Referat Zhur - Fizika, No 5, 1957, No 10784

Author : PUgachev, V.S.
Inst : Not given
Title : Application of Canonical Expansions of Random Functions to the Determination of the Optimum Linear System.

Orig Pub : Avtomatika i Telemekhanika, 1956, 17, No 6, 489-499

Abstract : The author treats a generalization of the theory of canonical expansion of random functions, previously developed by him, and the application of the theory of canonical expansions for the finding of a general solution of an equation that determines an optimum linear dynamic system, using the condition of minimum rms error.

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PUGACHEV, V.S. (Moskva)

Possible general solution for problems on determining optimum dynamical systems. Avtom. i. telem. 17 no.7:585-589 Jl '56. (MLRA 9:10)

(Mathematical physics) (Mechanics, Analytic)

PUGACHEV V.S.

Call Nr: QA273.P83

AUTHOR: Pugachev, V.S.

TITLE: Theory of Random Functions and Its Application to the Problems of Automatic Control. (Teoriya sluchaynykh funktsiy i yeye primeneniye k zadacham avtomaticheskogo upravleniya)

PUB. DATA: Gosudarstvennoye izdatel'stvo tekhniko-teoreticheskoy literatury, Moscow, 1957, 659 pp., 8000 copies

ORIG. AGENCY: None given

EDITOR: Sobolev, O. K.; Tech. Ed.: Gavrilov, S. S.

PURPOSE: The book is intended for scientists and engineers dealing with automatic controls and with the automatization of various branches of production.

COVERAGE: The monograph is a systematic presentation of the applied theory of random functions and of probability methods of the theory of automatic control. The author thanks Andreyev, N.I., Merkulova, Ye.P., Sedov, V.D., Sobolev,O.K. and Pugacheva, I.V. The book deals with Russian

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Theory of Random Functions and Its Application to the Problems (Cont.) Call Nr: QA273.P83

contributions. There are 56 references, 44 of which are USSR, 7 English, 2 German, 1 French, and 2 translations into Russian.

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2. Experimental foundations of the theory of probabilities. Frequency and probability of events. 19-22

3. Addition theorem of frequencies. Principle of addition law of probability. 22-24

Card 2/26

103-7-3/11

AUTHOR: DOSTUPOV, B.G., PUGACHEV, V.S. (Moscow)

TITLE: The Equation to Define a Probability Distribution, of the Integral of a System of Ordinary Differential Equations with Random Parameters (Uravneniye, opredelyayushcheye zakon raspredeleniya integrala sistemy obyknovennykh differentsial'nykh uravneniy. Russian)

PERIODICAL: Avtomatika i Telemekhanika, 1957, Vol 18, Nr 7, pp 620 - 630 (U.S.S.R.)

ABSTRACT: A general equation is derived, which determines the probability density of the integral of ordinary differential equations which contain random parameters. A possible method for an approximated integration of this equation is shown. This method is useful for computation on calculating machines. After determination of the integral-distribution law, all necessary integral moments, and especially their mathematical expectation as well as the correlation matrix can be determined according to the ordinary formulae of the probability theory. The method given here may also be applied for differential equations which contain random functions. For this purpose all random functions contained in the equations are to be approximated by finite sections of the canonical disintegration. The method is applicable to any system of ordinary differential equations under the following condition, - all functions containd in the equations are steady with respect to unknown functions and occasionally have steady derivations towards all unknown functions. In consideration of the complication of the necessary computations, the method given here at present

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103-7-3/11

The Equation to Define a Probability Distribution, of the Integral of a System of Ordinary Differential Equations with Random Parameters

is mainly of theoretical value as a means of a possible initial point for working out new methods of a statistical analysis of non-linear systems. (With 15 Slavic references).

ASSOCIATION Not given
PRESENTED BY
SUBMITTED 20.9.1956
AVAILABLE Library of Congress

Card 2/2

AUTHOR: Pugachev, V. S., (Moscow) 103-11-3/10

TITLE: A Canonical Representation of Random Functions by Integrals and their Application for the Determination of Optimum Linear Systems (Integral'nyye kanonicheskiye predstavleniya sluchaynykh funktsiy i ikh primeneniye k opredeleniyu optimal'nykh lineynykh sistem).

PERIODICAL: Avtomatika i Telemekhanika, 1957, Vol. 18, Nr 11, pp. 971-984 (USSR)

ABSTRACT: The problem of the canonical representation of random functions consists in finding the expression of any random function of the simplest type, viz. a random function the values of which at different argument-values are not in correlation with one another. This random function with a mathematical zero-expectation and values which are not in correlation is called "white noise" irrespective of the nature of its argument. The theory of the canonical representation of random functions by integrals and their application for the determination of optimum linear operators is here dealt with. A formula for the function of the weight of an optimum one-dimensional linear system is derived for the case of an infinite observation integral (infinite system memory), where the observed random function is a result of the

A Canonical Representation of Random Functions by Integrals and their Application for the Determination of Optimum Linear Systems. 103-11-3/10

passage of the "white noise" through a certain linear system. In special cases the well-known formulae by N. Wiener (New York 1949) and R. C. Booton (Proc.IRE, Vol. 40, Nr 8, 1952) are obtained from the formula mentioned here. There are 6 Slavic references.

SUBMITTED: March 11, 1957

AVAILABLE: Library of Congress

Card 2/2

Kotel'nikov, V. A., Member of Acad. Sci.

"New Methods of Detecting and Reproducing Signals in the Presence of Interferences."

scientific report presented at the Plenary Meeting of the Departmnet of Engineering Sciences, Acad. Sci. USSR, 16-17 June 1958.
(Vest. AN SSSR, 1958, No. 8, pp. 57-68)

AUTHOR: Pugachev, V.S. (Moscow) 103-19-6-2/13

TITLE: Determination of the Optimum System According to Any Criterion (Opredeleniye optimal'noy sistemy po proizvol'nomu kriteriyu)

PERIODICAL: Avtomatika i telemekhanika, 1958, Vol 19, Nr 6, pp 519 - 539 (USSR)

ABSTRACT: The present paper gives a method for determining the optimum operator A according to any criterion of the Bayes type (or a conditional Bayes criterion) according to formula (1) for the case where the observed accidental function Z and the signal W to be reproduced are expressed by the formulae (3) and (4). In this connection it is assumed that the accidental vector-function $[X(t), Y(s)]$ is normally distributed and statistically independent of the accidental vector $(U_1, \ldots, U_N)$. On that occasion it can be assumed without loss of generality, that the mathematical expectations of the accidental functions X and Y identically equal zero (References 1,2). The arguments t and s of the accidental functions are assumed as any scalar or vector variables which may in special cases possess several discreet components. Therefore the theory here given may be applied to

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scalar as well as to vector functions. In order to be able to use them in vector functions, it is sufficient to consider the component of every vector function as a scalar function of its arguments and the number. In this manner the method here given may be used for determining the optimum system in unidimensional as well as in multidimensional systems. As formula (5) shows it is sufficient for the solution of the problem posed to find a certain operator. A which guarantees the minimum of the conditional mathematical expectation of the function r with regard to the observed accidental function Z for every possible realization of the accidental function Z (except some realizations with a zero-sum of the probability of occurrence)... formula(6). The problem posed here is solved in a general form according to the method of the canonical decomposition of accidental functions. This method yields a sufficiently simple algorithm for finding the optimum operator. There are 6 references, 5 of which are Soviet.

SUBMITTED: December 16, 1957

Card 2/2

1. Servomechanisms--Mathematical analysis

Pugachev, V.S.

16(1) PHASE I BOOK EXPLOITATION SOV/2660

Vsesoyuznyy matematicheskiy s"yezd. 3rd, Moscow, 1956

Trudy. t. 4: Kratkoye soderzhaniye sektsionnykh dokladov. Doklady inostrannykh uchenykh (Transactions of the 3rd All-Union Mathematical Conference in Moscow. vol. 4: Summary of Sectional Reports. Reports of Foreign Scientists) Moscow, Izd-vo AN SSSR, 1959. 247 p. 2,200 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Matematicheskiy institut.

Tech. Ed.: G.N. Shevchenko; Editorial Board: A.A. Abramov, V.G. Boltyanskiy, A.M. Vasil'yev, B.V. Medvedev, A.D. Myshkis, S.M. Nikol'skiy (Resp. Ed.), A.G. Postnikov, Yu. V. Prokhorov, K.A. Rybnikov, P. L. Ul'yanov, V.A. Uspenskiy, N.G. Chetayev, G. Ye. Shilov, and A.I. Shirshov.

PURPOSE: This book is intended for mathematicians and physicists.

COVERAGE: The book is Volume IV of the Transactions of the Third All-Union Mathematical Conference, held in June and July 1956. The book is divided into two main parts. The first part contains summaries of the papers presented by Soviet scientists at the Conference that were not included in the first two volumes. The second part contains the text of reports submitted to the editor by non-Soviet scientists. In those cases when the non-Soviet scientist did not submit a copy of his paper to the editor, the title of the paper is cited and, if the paper was printed in a previous volume, reference is made to the appropriate volume. The papers, both Soviet and non-Soviet, cover various topics in number theory, algebra, differential and integral equations, function theory, functional analysis, probability theory, topology, mathematical problems of mechanics and physics, computational mathematics, mathematical logic and the foundations of mathematics, and the history of mathematics.

Bobrov, A.A. (Odessa). The Method of arbitrary functions in laying foundations for limit distributions 61

Volkonskiy, V.A. (Moscow). Multidimensional limit theorem for Markov chains with countable number of states 63

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Pugachev, V.S. (Moscow). Probability methods in the theory of automatic control. 66

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PUGACHEV, V.S. (Moskva)

Solution of the basic integral equation of the statistic theory of optimum systems in the finite form. Prikl. mat. i mekh. 23 no.1:3-14 Ja-F '59. (MIRA 12:2)
(Integral equations)

PUGACHEV, V.S. (Moskva)

Method for determining eigenvalues and eigenfunctions for a certain class of linear integral equations. Prikl. mat. i mekh. 23 no.3: 527-533 My-Je '59. (MIRA 12:5)
(Integral equations) (Eigenvalues) (Eigenfunctions)

BASE I BOOK EXPLOITATION SOV/4478

Pugachev, Vladimir Semenovich

Teoriya sluchaynykh funktsiy i yeye primeneniye k zadacham avtomaticheskogo upravleniya (Theory of Random Functions and Its Application to Problems of Automatic Control) 2nd ed., rev. and enl. Moscow, Fizmatgiz, 1960. 883 p. 10,150 copies printed.

Ed.: O.K. Sobolev; Tech. Ed.: N.Ya. Murashova.

PURPOSE: This book is intended for scientists and engineers working in the field of automatic control and automation of production in various branches of engineering. It may also be useful to specialists in radio engineering and other technical fields involving problems of transformation of signals which contain useful information as well as noise or interference.

COVERAGE: The book systematically presents the applied theory of random functions and also stochastic methods of the theory of automatic control (statistical dynamics of automatic control systems). After a brief treatment of the basis of the law of probability, the fundamental concepts of the theory of random functions are considered. A presentation of the general theory of linear systems is given. Methods for investigating the exactness of linear and nonlinear systems are con-

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AUTHOR: Pugachev, V.S. (Moscow)

TITLE: Method for Determining Optimal System According to the General Bayes' Criterion

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Energetika i avtomatika, 1960,Nr 2, pp 83-97 (USSR)

ABSTRACT: This paper was presented on January 10, 1959 at the Seminar on Probability Methods in the Theory of Automatic Control at the Institute of Automation and Remote Control, Academy of Sciences USSR. The method was also described in a paper presented at the Second Prague conference on the theory of information, statistical solutions and random processes. A method is presented for determining the optimum system from the general Bayes' criterion when the observed function and the signal to be detected or reproduced depend on a finite-dimensional random vector U with additive noise, with distribution normal and independent of the vector U. In certain cases the vector U has an infinite (denumerable) set of components. A special case is the previously published (Ref 1) method for linear dependence of the observed

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Method for Determining Optimal System According to the General Bayes' Criterion

function on the vector U. The method is also applicable to cases where the observed function may be reduced to the sum of a certain function of the vector U and the independent normally distributed noise by a non-linear transformation independent of the vector U.

1. Statement of the problem. The general problem of determining optimal systems intended for detection and reproduction of signals in the presence of noise may be formulated as follows. From the results of observation of the random function Z (t) in a certain region T of the measured argument, t, it is necessary to find the best estimate in a certain sense W*(s) of the signal W (s), statistically related to Z (t). The theory presented here is applicable to the most general case when the arguments t and s are arbitrary scalar or vector variables (or even elements of an arbitrary abstract space). Aside from problems of automation and electronics the method is applicable to analogous problems in other fields of science and engineering, for example weather prediction, detection and investigation of earthquakes on

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Method of Determining Optimal System According to the General Bayes' Criterion

a background of continuous oscillation of the earth's surface, determination of orbits of artificial satellites and cosmic rockets from results of observation, etc. In particular the theory gives the possibility of finding optimal multi-dimensional automatic systems having an arbitrary number of inputs and outputs. The region T of observation may be a discrete set (discrete system) interval or set of non-overlapping intervals. The following conditions are assumed in the method described for determining an optimal system from an arbitrary Bayes' criterion of the form of Eq (1.3): (a) the vector U is a finite-dimensional random vector with known probability density f (u). (b) the vector random function X (t), Y (s) has a normal distribution and is independent of the vector U. (c) For each realisation z of the observed function Z there exists such a function $W^{*}(s)$ that for an arbitrary function W (s) the inequality (1.4) is satisfied where M[X|z] is the conditional mathematical expectation of the quantity

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Method for Determining Optimal System According to the General Bayes' Criterion

X for the given realisation z of the random function Z. (d) For all possible values u of the vector U the function $\varphi(t, u)$ may be represented in the region of observation T by an expansion in characteristic functions of the random function X.
Condition (c) is sufficient for the existence of a non-random operator A such that the estimate (Eq 1.5) satisfies the condition of the optimum (Eq 1.3). This condition poses certain restrictions on the class of functions ℓ, φ and ψ to which the present method is applicable. In the majority of practical cases this condition, as well as the others, is satisfied.
2. Method of solution of the problem posed. After deriving the method the author concludes that it is applicable to certain problems in which the noise is non-additive and has a non-normal distribution. It is also applicable to certain problems in which the vector U has an infinite (denumerable) set of components.
3. Convergence of the process. In this section the author demonstrates convergence of various integrals and series

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Method for Determining Optimal System According to the General Bayes' Criterion

employed in the derivation of section 2.
4. Examples of application of the method. Five examples are considered.
5. Conclusion. The algorithm given by the method may be used for the numerical determination of an approximate optimal estimate of the signal using digital computers. The development of compact high-speed computers will permit the construction of real systems employing numerical procedures. The basic difficulty in the practical realisation of optimal systems is usually the absence of information on the a priori distribution of signal parameters, i.e. the probability density f (u). The above method for estimating the vector U in each operating cycle of the system and for constructing the estimate of probability density f (u) from estimates of the vector U obtained during the preceding cycles of system operation enables this difficulty to be overcome. This gives "learning" systems, which will approach closer and closer to the optimal system in each cycle of operation.

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PUGACHEV, V. S.

report to be presented at the 1st Intl Congress of the Intl Federation of Automatic Control, 25 Jun-5 Jul 1960, Moscow, USSR.

LERNER, A. Ya., - "The application of a self-adjusting system of automatic control"

MALOV, V. S., PSHENICHNIKOV, A. M., and [illegible] A. - "Industrial telemeasurement systems and digital technique"

MEYEROV, M. V. - "Some peculiarities of the structure of multi-communications regulation systems"

MIKHAYLOVSKIY, V. N. - "Evaluation indexes and the possibility of increasing the quality of telemeasurement systems"

NEMIROVSKIY, V. V. - "Concerning the problem of established routines in automatic regulation systems"

NETREBENKO, K. A. "Principals of construction of digital double code automatic compensators"

NEYMARK, Yu. I. - "Concerning the relation of systems of automatic regulation with the parameters of periodic movements"

NIKOLAYEV, N. S., and EPSHTEYN, V. L. - "System of automatic control of cutting of rolled metal on a continuous bar mill with the use of digital calculating machines"

ONDYNTSEV, V. M. - "Some principles of organizing systems of complex automation of large scale chemical production and optimization of these systems"

OSTROVSKIY, G. M. - "Systems of automatic regulation with intermittent change of parameters"

PEROV, V. P. - "Statistical synthesis of impulse systems"

PETROV, B. N. - "The invariant principle and its application in the calculation of linear and nonlinear systems"

PIVEN, V. D. - "The problem of autonomy in the technique of automatic control"

POPOV, E. P. - "Some problems of synthesis of automatic control non-linear systems"

PUGACHEV, V. S. - "Method of determining the optimum system with non-linear relation of the observed function with the parameters of the signal"

PUTSILLO, V. P., PETROV, V. V., RODIONOV, R. V., and VOLODIN, E. E. - "Principles of construction of a single class of extra control systems for automating production processes"

ROGINSKIY, V. N. - "The development of the theory of relay devices in the USSR"

ROZENBLAT, M.A. - "Dynamic characteristics of cores with right angle hystereses winding and their influence on magnetic boosters"

ROZONER, L.I. - "Varied methods of investigating the quality of automatic control systems"

RUSHINSKIY, V. M. - "Dynamics of automatic regulation of boiler-turbine units"

SHUMILOVSKIY, N. N., MEL'TTSER, L. V., NAUMOV, A. A., MEN-CHZHI-CHZHUN, and PIVOVAROV, L. A. - "Automatic control of composition of multi-ingredient mixtures"

SHAGOVSKIY, E. S., and SEGALIN, V. G. - "Some results of work for the utilization of radioactive radiation for automatic control of mining machinery"

SOLODOVNIKOV, Y. V., BATKOV, A. M., BABURIN, V. M., VAL'DENBERG, Yu. S., MATVEYEV, P. S., and POKROVSKIY, A. K. - "Analyses and synthesis of automatic control systems with the aid of calculating machine facilities"

STAKHOVSKIY, R. I., FITSNER, L. N., and [illegible] - "Automatic optimizers and their use for solution of variation problems in automatic synthesis"

STRAKHOV, S. V. - "A system of alternating current electric drives with autonomous power supply"

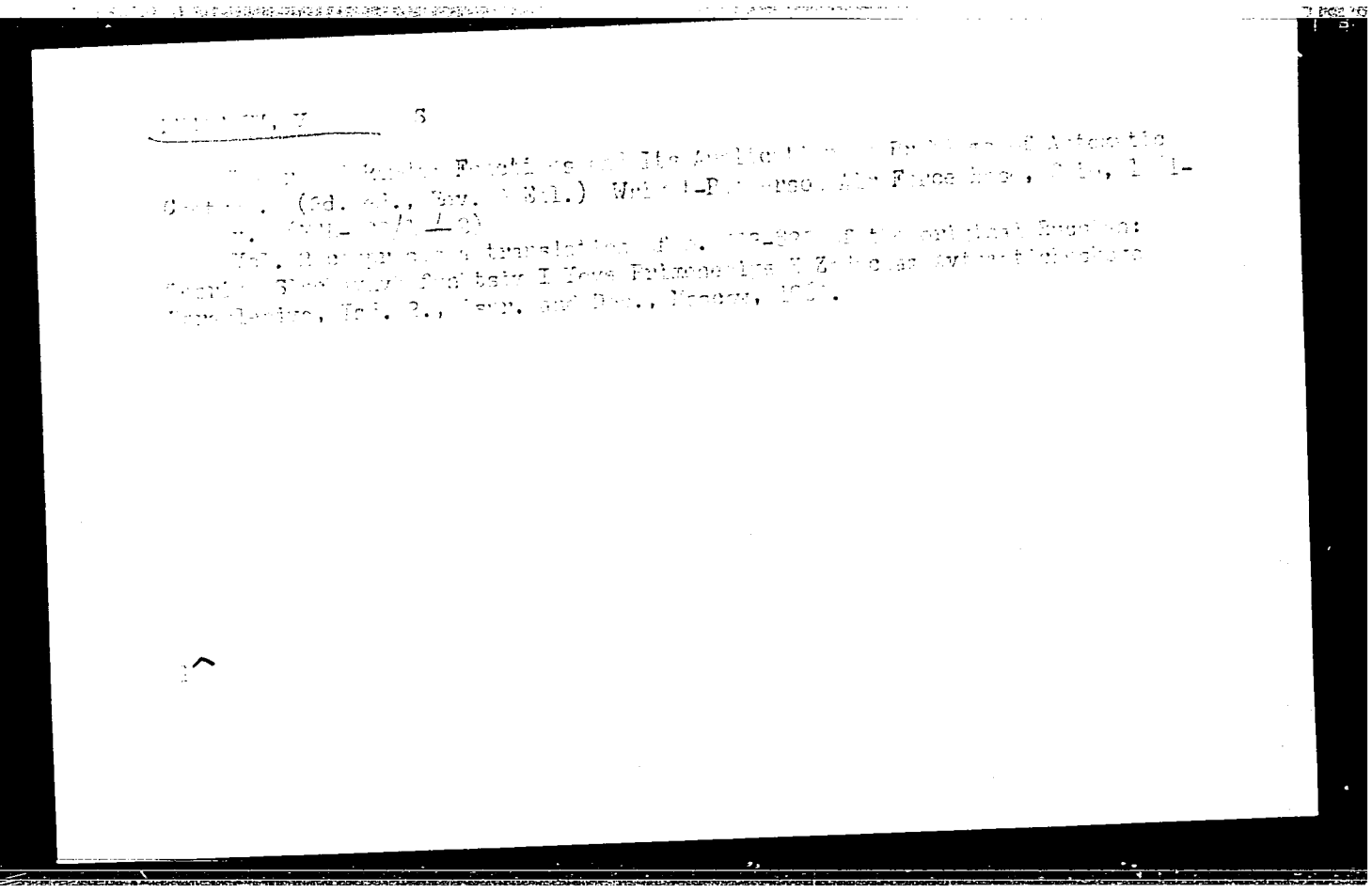
TAKSAR, I. M., and YANUSHKOVSKIY, V. A. - "Apparatus for technical control of production with the use of nuclear radiation"

TEODORCHIK, K. F., and BENDRIKOV, G. A. - "Methods of organizing the trajectory of roots of linear systems and qualitative determination of type of trajectory"

TSYPKIN, Ya. Z. - "Elements of the theory of digital automatic systems"

VENCHKOVSKIY, D. B., KASHIRIN, V. A., CHUGIN, Yu. I., and SHASTOVA, G. A. - "Static stability of telemeasurement"

VENIKOV, V. A. - "Interactions of a mathematical modeling and calculating technology experiment in calculating loads in electrical systems"



TRAPEZNIKOV, V.A., akademik, glav. red.; AYZERMAN, M.A., doktor tekhn. nauk, red.; AGEYKIN, D.I., kand. tekhn. nauk, red.; ARTOBOLEVSKIY, I.I., akademik, red.; BATRACHENKO, L.P., inzh., red.; VORONOV, A.A., doktor tekhn. nauk, red.; GAVRILOV, M.A., doktor tekhn. nauk, red.; DIKUSHIN, V.I., akademik, red.; KARIBSKIY, V.V., kand. tekhn. nauk, red.; KOGAN, B.Ya., kand. tekhn. nauk, red.; KRASIVSKIY, S.P., red.; KULEBAKIN, V.S., akademik, red.; LERNER, A.Ya., doktor tekhn. nauk, red.; LETOV, A.M., kand. tekhn. nauk, red.; MEYEROV, M.V., doktor tekhn. nauk, red.; PETROV, B.N., akademik, red.; PUGACHEV, V.S., doktor tekhn. nauk, red.; SOTSKOV, B.S., red.; STEFANI, Ye.M., kand. tekhn. nauk, red.; KHRAMOY, A.V., kand. tekhn. nauk, red.; TSYPKIN, Ya.Z., doktor tekhn. nauk, prof., red.; CHELYUSTKIN, A.O., kand. tekhn. nauk, red.; CHILIKIN, M.G., doktor tekhn. nauk, red.; NAUMOV, B.N., kand. tekhn. nauk, red.; KASHINA, P.S., tekhn. red.

[Transactions of the International Federation of Automatic Control, 1st International Congress, Moscow, 1960] Trudy I Mezhdunarodnogo kongressa Mezhdunarodnoi federatsii po avtomaticheskomu upravleniiu. Moskva, Izd-vo Akad. nauk SSSR. Vol.2. [Theory of discrete systems, optimal systems, and adaptive automatic control systems] Teoriia diskretnykh, optimal'nykh i samonastraivaiushchikhsia sistem. 1961. 996 p.
(MIRA 14:9)

1. International Federation of Automatic Control, 1st International Congress, Moscow, 1960. 2. Chlen-korrespondent AN SSSR (for Sotskov)
(Automatic control)

41978
Z/507/60/000/000/004/005
B125/B112

AUTHOR: Pugachev, V. S. (Moscow)

TITLE: An efficient method of determining the Beyer solution

SOURCE: Conference on Information Theory, Statistical Decision Functions, Random Processes. 2d, Prague, 1959. Transactions. Prague, Czsl. Academy of Sciences, 1960. 843p. biblio. 531-540

TEXT: An efficient Beyer solution to the following problem is determined for the case where the observable and estimable random functions depend on a random vector U with a finite number of dimensions. The best estimate $W^*(s)$, $s \in S$ of the random functions $W(s)$ has to be determined according to the Beyer criterion. The "loss function" $r(W,W^*)$ is a given function, or a functional of W and W^*. $Z(t)$, $t \in T$ is an observable random function. $Z(t) = \varphi(t,U)+X(t)$, $W(s) = \psi(s,U,Y(s))$ is valid. $\varphi(t,v)$ and $\psi(s,u,y)$ are given functions. The random vector U with a finite number of dimensions is characterized by the "probability measure" P_n. The determination of the Beyer solution reduces to the

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determination of the operator A in $W^* = AZ$. W^* has to be determined from the results of the observation of the random function Z. The mathematical expectation values X and Y can be set equal to zero without loss of generality. The linear functionals $\Omega(\tau)$ satisfy the conditions

$$\Omega^{(\nu)} x_\mu = \delta_{\nu\mu}, \tag{2.2}$$

and

$$x_\nu(t) = \frac{1}{D_\nu} \Omega_\tau^{(\nu)} K_x(t, \tau), \tag{2.3}.$$

D_ν is the dispersion of the random quantities V_ν, and $K_x(t,\tau)$ is a correlation function of the random functions. The points x and y are points contained in the set A. The algorithm found here for obtaining the Beyer solution can be applied also if some or all components of the vector U are not random quantities but merely unknown quantities. A sequence of estimates W_n (which minimize an integral of type

$$I(Z, W^*) = \int_R r(\psi(s, u, A^{(\varphi)}Z - \omega(u)), W^*) \times \overline{\times \exp\{L(u)\,Z - \tfrac{1}{2}\beta(u)\}\,dP_u}. \qquad (2.17))$$

converges towards W. The optimal estimate of W^* is a function of the variable s and the random quantities H_p. σ must be determined by directly minimizing an integral. If φ and ψ are linear with respect to U, then the vector A of the Beyer solution is a linear operator. The case with non-random vector U with any component is the limiting case of the normal distribution of U if the dispersion of its components increases without limitation. The present method of determining the Beyer solution is sufficiently general and solves various problems of the optimal observation and reproduction of signals in the presence of interferences.

ASSOCIATION: Akademiya nauk SSSR. Institut avtomatiki i telemekhaniki (Academy of Sciences USSR, Institute of Automation and Telemechanics)

32583
S/569/61/003/000/001/011
D201/D305

6.9000

AUTHOR: Pugachev, V.S. (USSR)

TITLE: A method of determining the optimum system with a non-linear dependence of the observed function on the signal parameters

SOURCE: International Federation of Automatic Control. 1st Congress. Moscow, 1960. Statisticheskiye metody issledovaniya. Teoriya struktur, modelirovaniye, terminologiya, obrazovaniye. Moscow, Izd-vo AN SSSR 1961, 29-39

TEXT: In an earlier paper (Ref. 5: Doklad na 2-y Prazhskoy Konferentsii po teorii informatsii (Paper Read at 2nd Prague Conference on the Information Theory) 1959), the author gave a method of determining the optimum estimate of W^* of the signal W from a given realization of observed function Z for the case when

$$Z(t) = \varphi(t, U) + X(t) \qquad (2.1)$$

and

$$W(t) = \psi(t, U, Y(t)), \qquad (2.2)$$

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where $\psi(t, U)$ = given function of time t and a random parameter U; $\psi(t, U, Y(t))$ = also a given function of t, U and of a random function Y(t); X(t) = a certain random function, representing the sum of an "irregular" random part of the signal contained in Z and noise, the random vector function $[X(t); Y(t)]$ having a normal distribution and being independent of the random vector U. In the present article the author considers determining the optimum system from the criterion of the probability minimum that the error will exceed certain given limits, i.e. the case when the system has to determine the scalar parameter of the signal U, so that W = U, W* = U*. Such a system is shown to be equal to a system for determining a two-dimensional parameter of the signal, optimum from the view point of minimum probability of the modulus of error exceeding a given lower end value a of the admissible error range. The method of Ref. 5 (Op.cit.) results in the following algorithm, according to which the optimum system reproduces W* of signal W from a given realization of input function Z: 1) Linear operators A(o) and L(u) have to be determined. These operators must satisfy

$$A_{\tau}^{(o)} K_x(t, \tau) = K_{yx}(s, t), \quad (t \in T) \qquad (2.3)$$

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A method of determining the optimum ...

$$L^{t}u)_{\tau}K_{x}(t, \tau) = \varphi(t, u), \quad (t \in T), \tag{2.4}$$

where $K_x(t, \tau)$ = the correlation functions of random function X; $(K_{yx}(s, t))$ = the mutual correlation function of random functions Y and X; T = the interval of time during which function Z is applied to the input of the optimum system; s = instant of ending the observation of function Z. 2) Functions (2a) have to be determined; 3) Function $W^*(t)$ has to be found so that it satisfies for the minimum of integral

$$I(Z, W^*) = \int_{-\infty}^{\infty} r(\psi(s, u, A^{(o)}Z - \omega(u)), W^*) \times f(u)\exp\left\{L(u)Z - \frac{1}{2}\beta(u)\right\} du \tag{2.10}$$

for a given realization of function z, function f(u) representing the probability density of random vector U. To solve the problem of signal detection in the presence of noise, the above algorithm may

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be used assuming

$$r(W, W^*) = \begin{cases} 0 \text{ for } W = 0,\ W^* \leqslant c \text{ or } W \neq 0,\ W^* > c, \\ 1 \text{ for } W \neq 0,\ W^* \leqslant c, \\ \lambda \text{ for } W = 0,\ W^* > c, \end{cases} \qquad (6.1)$$

where λ is unity in the case of the criterion of an "ideal observer" and an indetermined parameter in the case of the Neuman-Pearson criterion. The basic difficulty in using the above algorithm for designing real systems in the absence of knowledge of the apriori probability density of the signal parameters f(u). This difficulty may be overcome using the same algorithm for determining the evaluation of probability density f(u). As a result, a system is obtained which will store the experiment and with every cycle approaches nearer and nearer to the optimal, i.e. the self-teaching system. Such a system is designed by applying the above algorithm to every step of the system operation. It is stated in conclusion that the suggested method of determining an optimum system is quite universal and makes it possible to determine with great efficiency the algorithms of optimum systems designed for detecting and reproducing signals in the presence of noise. The method is easily adop-

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ted in cases when noise is non-additive and not normal and may be used for a real system design provided the designer has fast computers at his disposal. The method defines also the limit theoretical possibilities of systems for given conditions. A discussion followed, in which the following took part: V.S. Pugachev (USSR) and G.P. Tartakovskiy (USSR). There are 1 figure and 11 references: 6 Soviet-bloc and 5 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: D. Middleton, Journ. Appl. Phys., v. 24, 1953; D. van Meter and D. Middleton, Trans. IRE PGIT-4, 1954; D. Middleton and D. Van-Meter, Journ. Soc. Indust. Appl. Math., v. 3, 1955, v. 4, 1956; K. Winkelbaner, Trans. I. Prague conf. Inform. theory, 1956.

PUGACHEV, V.S (Moskva)

Use of the theory of Markov's processes in the analysis of the accuracy of automatic control systems. Izv. AN SSSR. Otd. tekh. nauk. Energ. i avtom. no.3:46-57 My-Je '61. (MIRA 14:7)
(Automatic control)

S/024/61/000/005/006/009
E140/E135

AUTHOR: Pugachev, V.S. (Moscow)

TITLE: The theory of detection and estimation of signals dependent on a denumerable set of parameters

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Energetika i avtomatika. no.5, 1961, 123-135

TEXT: This work is a continuation of the author's own previous studies (e.g. Ref.2: V.S. Pugachev, A Method for Determining Optimum Systems Using General Bayes Criteria. IRE Trans. on Circuit Theory, 1960, Vol. CT-7, No.4). It concerns the detection and estimation of a useful signal with added Gaussian noise, in which the receiver gives at its output a best approximation to a certain random function related in a given manner to the useful signal. The random output function is frequently a linear transformation of the useful signal. The author has previously given a solution on the basis of an arbitrary Bayes criterion for the case where the useful signal is a known function of an independent variable - usually time - and

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S/024/61/000/005/006/009
E140/E135

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an unknown vector parameter. The latter can depend on a denumerable set of parameters, thus constituting a denumerable dimensional vector. When the useful signal also has a normal distribution the conditions are satisfied which permit the simultaneous canonical expansion of the useful signal and the noise in a common system of coordinate functions. After simple transformation the author shows that the problem of finding the simultaneous canonical expansion of two random functions in a common system of coordinate functions reduces to the determination of the characteristic values of a certain equation. If the set of values of the independent argument at which it is necessary to represent the random functions is discrete the solution is given by a set of finite sums leading to the solution of a system of homogeneous linear algebraic equations. The problem is equivalent to the simultaneous reduction of two quadratic forms to a sum of squares. If the set of values represents a region or a finite set of regions the sums become integrals and it becomes necessary to solve a homogeneous linear integral equation. If the random functions to be represented are vector random functions

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and the set of values on which they are to be represented by the canonical expansions constitutes a region or finite set of regions, the solution leads to a system of homogeneous linear integral equations. It is stated that the following propositions can be demonstrated by standard procedures of the theory of linear integral equations with symmetrical kernel. If the system of characteristic functions of the kernels is complete, all characteristic values are finite, real and non-negative. For real kernels there is at least one real solution for each characteristic value. The solutions corresponding to different characteristic values are orthogonal. If several linearly independent solutions correspond to a given characteristic value they can be orthogonalized by standard methods. The article does not investigate the question of the existence of characteristic functions, but it is stated that in many cases of practical importance they do exist, such as in the case of stationary random functions. An example is given of two stationary random functions of a scalar variable having rational spectral densities. The article then passes to consideration of the problem of detecting a

PUGACHEV, V.S.

SOV/6371

Transactions of the Sixth Conference (Cont.)

41. Kartvelishvili, N. A. Problem of Optimum Regime in an Energetic System 213

42. Levin, B. R., and V. S. Rozanov. Investigation of Transmission Capacity of Multichannel Systems With Consideration of the Statistical Structure of the Source 215

43. Leonov, Yu. P. Forming-Filter Problem and Optimum Linear Systems 223

44. Manevich, D. V. On the Repetition of Groups of Events in a Scheme With Variable Probabilities 225

45. Mikhalevich, V. S., and A. V. Skorokhod. On the Statistics of Certain Processes 229

46. Pugachev, V. S. Methods for Solving a System of Integral Equations Encountered in the Determination of Optimum Multidimensional Systems 233

Transactions of the 6th Conf. on Probability Theory and Mathematical Statistics and of the Symposium on Distributions in Infinite-Dimensional Spaces held in Vil'nyus, 5-10 Sep '60. Vil'nyus: Gospolitizdat Lit SSR, 1962. 493 p. 2500 copies printed

PUGACHEV, Vladimir Semenovich; SOBOLEV, O.K., red.; MURASHOVA, N.Ya., tekhn. red.

[Theory of random functions and its application to problems of automatic control]Teoriia sluchainykh funktsii i ee primenenie k zadacham avtomaticheskogo upravleniia. Izd.3., ispr. Moskva, Fizmatgiz, 1962. 883 p. (MIRA 15:12)
(Automatic control) (Functions)

PUGACHEV, V. S. (Moscow)

"On the Theory of Detection and Estimation of Signals Illustrating their Random Functions."

report presented at the 3rd Prague Conference on Information Theory, Statistical Decision Functions and Random Processes, Liblice, Czechoslovakia, 4-14 June 1962.

L 12253-63 EWT(d)/FCC(w)/BDS AFFTC Pg-4 IJP(C)
S/271/63/000/004/017/045 56

AUTHOR: Pugachev, V. S.

TITLE: Methods for the solution of systems of integral equations encountered in determining optimal multidimensional systems 16

PERIODICAL: Referativnyy zhurnal, Avtomatika, telemekhanika i vychislitel'naya tekhnika, no. 4, 1963, 43, abstract 4A270 (Tr. VI Vses. soveshchaniya po toerii veroyatnosti i matem. statistike, 1960; Vil'nyus, Gos. izd-vo polit. i nauchn. LitSSR, 1962, 233-237)

TEXT: A solution is derived for systems of linear integral equations of the first type which determine the weight functions of an optimal system in a class of linear systems, according to the criterion of the minimum of the average square error. The solution is given for two examples: 1. where the memory of the system coincides with the full time of its operation, while interference can be represented in the form:

$$X(t) = \int_{t_0} w(t, \tau)\,dY(\tau) \qquad (1).$$

Here, $Y(\tau)$ is a vector random function, the components of which are mutually

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uncorrelated; 2. the time of operation is equal to infinity, while the components of the vector random function X(t) are stationary and stationary-bound by the random functions; 3. when the memory of the system is less than the full time of its operation. The author also gives algorithms for solving integral equations for the more general case, in which the matrix of the weight functions W in (1) is determined by a system of linear differential equations. There is a bibliography of 19 items.
I. P.

[Abstracter's note: Complete translation].

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001343530007-5"

SERGEYEV, Vladimir Ivanovich; PUGACHEV, V.S., doktor tekhn.nauk, prof., retsenzent; LYUBATOV, Yu.V., kand. tekhn.nauk, dots., retsenzent; KOTOV, V.A., red.izd-va; GUSEVA, A.P., tekhn. red.

[Fundamentals of the instrument accuracy of electromechanical networks; supplementary to regulation and control devices] Osnovy instrumental'noi tochnosti elektromekhanicheskikh tsepei v prilozhenii k priboram upravleniia i kontrolia. Moskva, Izd-vo Akad. nauk SSSR, 1963. 214 p. (MIRA 16:7)
(Electronic control)

ACCESSION NR AM4021936 BOOK EXPLOITATION S/

Pugachev, V. S.; Kazakov, I. YE.; Gladkov, D. I.; YEvlanov, L. G.; Mal'chikov, S. V.; Mishakov, A. F.; Sedov, V. D.; Sokolov, V. I.

Principles of automatic control (Osnovy* avtomaticheskogo upravleniya), Moscow, Fizmatgiz, 1963, 646 p. illus., biblio., index. 15,000 copies printed.

TOPIC TAGS: automation, automatic control, linear control system, nonlinear control system

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SUB CODE: CP SUBMITTED: 26Jul63 NR REF SOV:061

OTHER: 011 DATE ACQ: 27Dec63

Card 2/2

KHRAMOY, A.V. [deceased]; MEYEROV, M.V.; AYZERMAN, M.A.; ULANOV, G.M.; TSYPKIN, Ya.Z.; FEL'DBAUM, A.A.; LERNER, A.Ya.; PUGACHEV, V.S.; IL'IN, V.A.; GAVRILOV, M.A.

Work of the Institute of Automatic and Remote Control on the development of the theory of automatic control during 1939-1964. Avtom. i telem. 25 no. 6:763-807 Je '64. (MIRA 17:7)

SKLYAREVICH, Akiva Nukhimovich; PUGACHEV, V.S., doktor tekhn. nauk, prof., retsenzent; FURMANOV, D.S.

[Operator methods in the statistical dynamics of automatic control systems] Operatornye metody v statisticheskoi dinamike avtomaticheskikh sistem. Moskva, Nauka, 1966. 459 p. (MIRA 18:3)

PUGACHEV, V.S.

Effect of prolonged use of phthivazide on thiamine metabolism in experimental tuberculosis. Probl. tub. 41 no.6:82-86 '63. (MIRA 17:9)

1. Iz kafedry ftiziatrii (zav. - prof. Ye.D. Petrov) Kiyevskogo instituta usovershenstvovaniya vrachey i biokhimicheskoy laboratorii (zav. - starshiy nauchnyy sotrudnik R.M.Izabolinskaya) Ukrainskogo instituta tuberkuleza i grudnoy khirurgii.

PUGACHEV, V.S. [Puhachov, V.S.]

Effect of prolonged administration of streptomycin and phthivazide on the thiamine content of rabbit tissue and its excretion in the urine. Ukr. biokhim. zhur. 35 no.1:63-71 '63 (MIRA 17:5)

1. F.G. Yanovsky Ukrainian Institute of Tuberculosis and Thoracic Surgery.

PUGACHEV, V.S.

Influence of prolonged antibacterial therapy on thiamine metabolism in pulmonary tuberculosis. Vop. med. khim. 7 no.5:498-504 S-O '61. (MIRA 14:10)

1. The 1st Therapeutical Clinic and Biochemical Laboratory of the F.G.Yanovskiy Ukrainian Institute of Tuberculosis.
(TUBERCULOSIS) (THIAMINE)

PUGACHEV, Ya.I.

Correct forms of solutions of Einstein's formulae. Izv.vys.ucheb.zav.; fiz. no.1:31-34 '61. (MIRA 14:7)

1. Krasnodarskiy institut pishchevoy promyshlennosti.
(Equations—Numerical solutions) (Relativity)

PUGACHEV, Ya.I.

Mikhail Vasil'evich Lomonosov; on the 250th anniversary of his birth.
Izv.vys.ucheb.zav.; pishch. tekh. no.6:7-10 '61. (MIRA 15:2)
(Lomonosov, Mikhail Vasil'evich,1711-1765)

69165
S/139/59/000/06/023/034
E032/E114

24,4200

AUTHOR: Pugachev, Ya.I.

TITLE: The Use of a Flat Space in the Gravitational Field Theory

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1959, Nr 6, pp 152-161 (USSR)

ABSTRACT: In addition to the required Riemann space a second known space is introduced into the theory of relativity. Both spaces are considered in terms of the same coordinates. A number of tensors and tensor relationships are obtained which are not possible in the usual theory. In particular, it is possible to separate out from the total field both the gravitational field, which has a tensor character, and the noncovariant field of inertial forces which appears as a result of the transformation of coordinates. If the auxiliary space is taken to be flat, then many of the relationships are considerably simplified. The problem of the choice of the coordinates is considered, and a general tensor expression for additional conditions to the basic field equation is obtained, including a number of differential identities. Of the two spaces which take part in the theory, only one can be identified

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The Use of a Flat Space in the Gravitational Field Theory

with the real "physical" space. The other space must be looked upon as an abstract configuration space. Equally, it cannot be determined whether the transformation of the flat space into the Riemann space by introducing gravitational field sources is a real process. In other words, the general theory of relativity can be interpreted with the aid of the two-metric formalism as the theory of gravitation in a flat space. Since the introduction of a second space does not involve the use of any new mathematical apparatus, or any new physical assumptions, it follows that the well-known results of the theory of relativity (astronomical effects, etc.) remain unaltered. It is therefore impossible to determine whether the real space-time continuum is flat or curved. There are 8 references, of which 3 are Soviet, 1 English, 1 German, 1 a Russian translation from English and 1 a Russian translation from German.

Card 2/2

ASSOCIATION: Krasnodarskiy institut pishchevoy promyshlennosti (Krasnodar Institute of the Food Industry)

SUBMITTED: November 13, 1958

PUGACHEV, Ya.I.

Generalized Lorentz conditions for a spherically symmetric gravitational field. Izv. vys. ucheb. zav.; fiz. no.1:76-80 '64. (MIRA 17:3)

1. Krasnodarskiy politekhnicheskiy institut.

PUGACHEV, Ya.I.

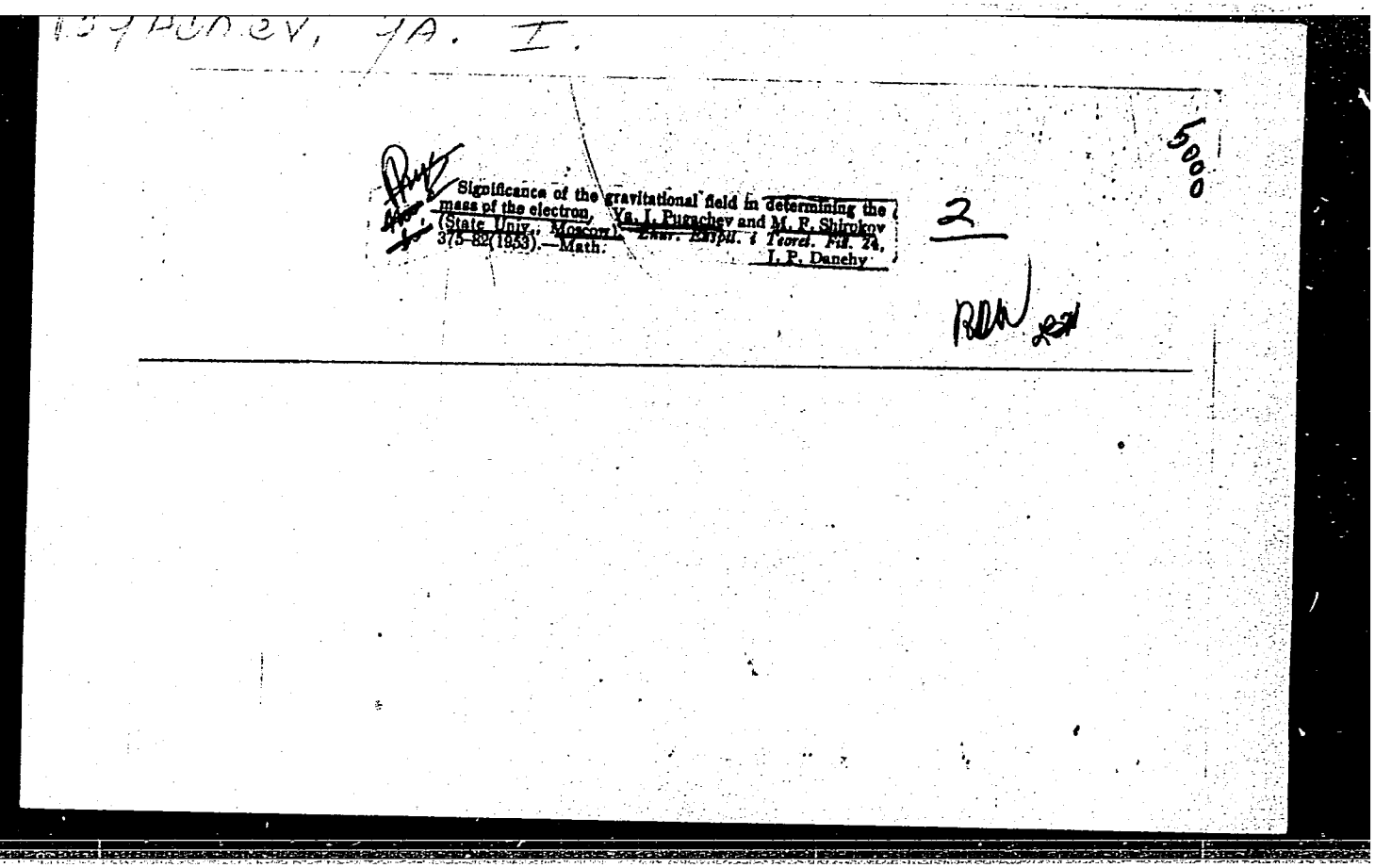
Application of two-dimensional space to the gravitational field theory. Izv.vys.ucheb.zav.; fiz. no.6:152-161 '59. (MIRA 13:6)

1. Krasnodarskiy institut pishchevoy promyshlennosti.
(Gravitation)

PUGACHEV, Ya.I.

Single method for constructing classical theories of an electromagnetic field. Trudy KIPP no.16:33-36 '57. (MIRA 12:7)

1. Krasnodarskiy institut pishchevoy promyshlennosti. Mekhanicheskiy fakul'tet, kafedra fiziki.
(Field theory)



PUNCEV, YA. I.

5000

Significance of the gravitational field in determining the mass of the electron. Ya. I. Puncchev and M. F. Shirokov (State Univ., Moscow). *Zhur. Eksptl. i Teoret. Fiz.* 24, 375–82(1953).—Math.

I. P. Danchy

2

RDW

PUGACHEV, Ya.I.

Motion of a test particle in a conformally flat space. Izv.vys. ucheb.zav.;fiz. no.1:45-47 '62. (MIRA 15:6)

1. Krasnodarskiy institut pishchevoy promyshlennosti.
(Kinematics)
(Spaces, Generalized)

PUGACHEV, YA. I.

"A Closed System of Equations of Gravitation of the General Theory of Relativity, and Some of Its Applications." Moscow Order of Lenin State U imeni M. V. Lomonosov, Moscow, 1955. (Dissertation for the Degree of Candidate in Physical and Mathematical Sciences)

SO: M-955, 16 Feb 56

S/139/62/000/001/007/032
E032/E114

AUTHOR: Iugachev, Ya.I.

TITLE: Motion of a test particle in a conformally plane space

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, no.1, 1962, 43-47

TEXT: In a previous paper the author studied Einstein's equations, using the conformal correspondence between the required (Riemann) and the given (plane) space for which the metrics ds and $d\mathring{s}$ are related by $ds = \varphi d\mathring{s}$, where φ is a function which depends on all the four coordinates. In particular, for a uniform distribution of matter in space one can easily obtain the exact solution by direct integration. It was found that this solution was not consistent with the current expanding-universe theory. In the present paper, an analysis of the motion of a test particle, based on an exact solution of the equations of motion, is said to throw doubt on the expansion hypothesis. It is assumed that the particle moves in the gravitational field along the geodesic

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$$\frac{d^2x_\mu}{ds^2} + \Gamma^{\mu}_{\alpha\beta} \frac{dx_\alpha}{ds} \frac{dx_\beta}{ds} = 0 \qquad (2)$$

and it is shown that the observed particle velocity is the same in both spaces. It follows that measurements of real velocities cannot be used as a deciding criterion for the determination of the real character of the space-time continuum. This result holds for any distribution of gravitational-field sources. It is also shown that the three-dimensional velocity of the test particle is in general independent of the gravitational field, if it is described with the aid of a conformally-plane space. It is concluded that either the use of the conformal representation in the study of the gravitational field on cosmic scale is unjustified, or Hubble's effect is not associated with a real recession of galaxies.

ASSOCIATION: Krasnodarskiy institut pishchevoy promyshlennosti
Card 2/2 (Krasnordar Institute of the Food Industry)
SUBMITTED: November 18, 1960

PUGACHEV, Ya.I.

Conformal mapping in the general relativity theory and some problems of cosmology. Izv. vys. ucheb. zav.; fiz. no. 1:46-53 '60.
(MIRA 13:12)

1. Krasnodarskiy institut pishchevoy pishchevoy promyshlennosti.
(Conformal mapping) (Relativity (Physics))

PUGACHEV, Ya. I.

-4

USSR.

9938. Part played by the gravitational field in the formation of the mass of an electron. YA. I. PUGACHEV AND M. F. SHIROKOV. *Zh. eksper. teor. Fiz.*, 23, No. 4, 375–82 (1953) *In Russian.* 530.145

Investigates the gravitational field of a point charge the electromagnetic field of which is determined by equations of linear electrodynamics with higher derivatives. As a rule, the gravitational field is found to be divergent, and both the mass m and charge e_0 of the particle are introduced into the theory as integration constants independent of each other. The regular solution can only be obtained when a definite relationship exists between m and e_0. Unlike in the special theory of relativity, the mass cannot be of electromagnetic origin only. Its gravitational part is found to be $\sim e^2k_0/8c^2$, and so cannot be neglected even in the first approximation. See also Abstr. 44–45 (1949).

F. LACHMAN

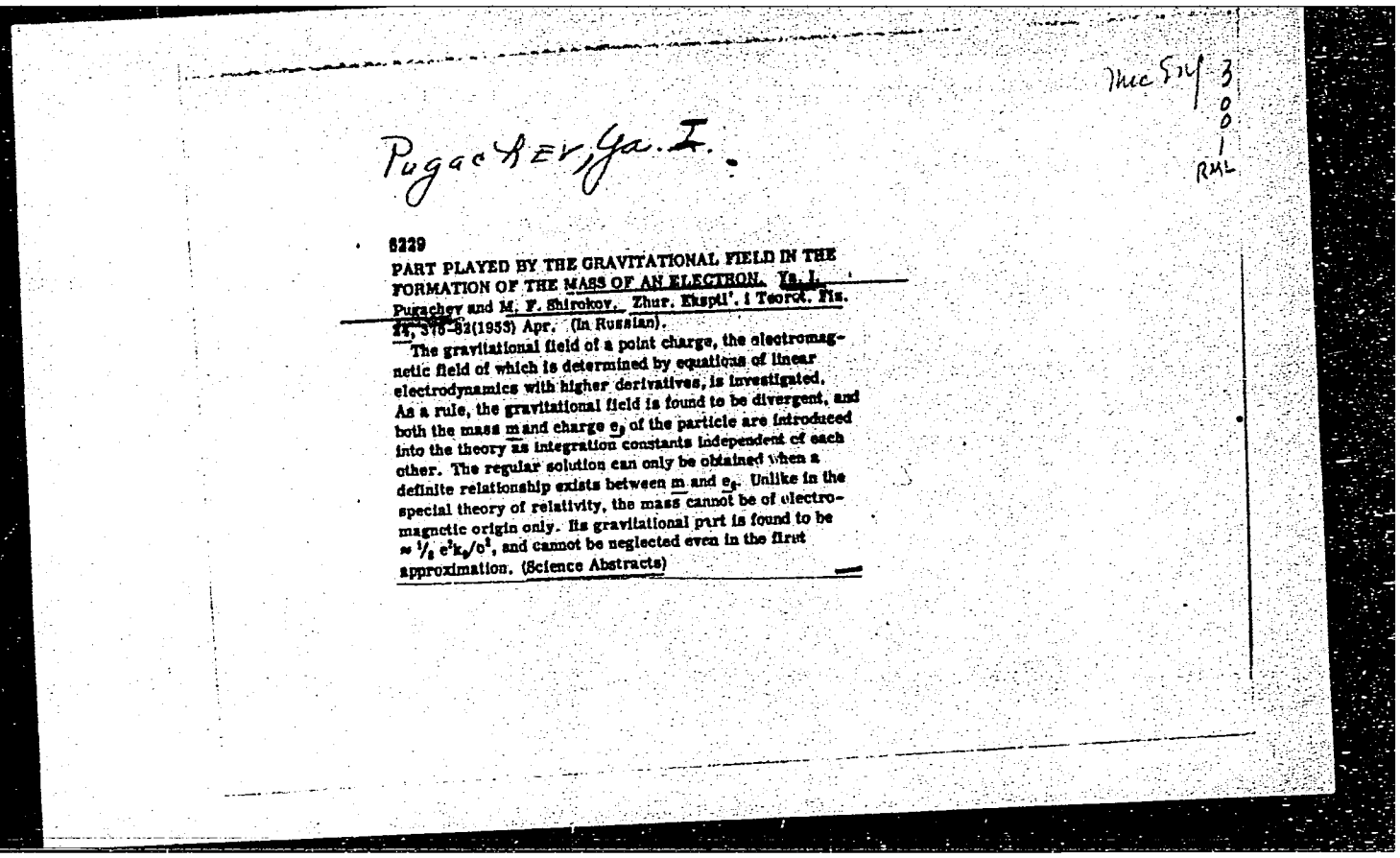
PUGACHEV, Ya. I.

PUGACHEV, Ya. I. --"Coordinate Conditions in the General Theory of Relativity and Their Application to the Calculation of Gravitational and Electromagnetic Fields." Moscow, 1956. (Dissertation for the Degree of Candidate in Physicomathematical Sciences.)

So.: Knizhnaya Letopis', No 7, 1956.

PUGACHEV, Ya.I.; SHIROKOV, M.F.

Role of the gravitation field in the formation of electron masses. Zhur.eksp. i teor.fiz. 24 no.4:375-382 Ap '53.(MLRA 7:10)
(Electrons) (Gravitation)



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Pugachev, Ya. I.

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PART PLAYED BY THE GRAVITATIONAL FIELD IN THE FORMATION OF THE MASS OF AN ELECTRON. Ya. I. Puzachev and M. F. Shirokov. Zhur. Eksptl'. i Teoret. Fiz. 25, 376-82(1953) Apr. (In Russian).

The gravitational field of a point charge, the electromagnetic field of which is determined by equations of linear electrodynamics with higher derivatives, is investigated. As a rule, the gravitational field is found to be divergent, and both the mass m and charge e_0 of the particle are introduced into the theory as integration constants independent of each other. The regular solution can only be obtained when a definite relationship exists between m and e_0. Unlike in the special theory of relativity, the mass cannot be of electromagnetic origin only. Its gravitational part is found to be $\approx \frac{1}{2} e^2 k_0 / c^2$, and cannot be neglected even in the first approximation. (Science Abstracts)

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AUTHOR: Pugachev, Ya.I.

TITLE: Conformal Representation in the General Theory of Relativity and Certain Problems in Cosmology

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, Nr 1, pp 46-53 (USSR)

ABSTRACT: Among various additional assumptions used in the solution of Einstein's equations (spherical symmetry, weak field, static contents etc) the assumption that there is a conformal correspondence between the flat (Euclidean) space without gravitational field sources and the real (Riemann) space-time occupies an important place. This hypothesis, which was first put forward by Friedmann (Ref 1), leads to the well-known solution which forms the basis of the so-called expanding universe theory. From the cosmological point of view, the main result of the expanding universe theory is that the world is finite in space and time. A similar conclusion is reached on the basis of other assumptions, eg the introduction into the

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Conformal Representation in the General Theory of Relativity and Certain Problems in Cosmology

gravitational equation of a cosmological term. Modern modifications of the theory often include the suggestion of continuous creation of matter and energy. The conformal correspondence assumption leads to the result that the gravitational equations of the general theory of relativity degenerate into a general scalar equation (Eq 2.10) independently of the nature and the distribution of the sources of the gravitational field. Thus the use of conformal representation reduces to the replacement of a tensor field by the scalar field. If the metric given by Eq(1.1) is used to solve the static and spherically symmetric Schwarzschild problem, then the classical equations of motion are obtained for a test body, and astronomical effects of the theory of relativity are not explained. There are also considerable differences in the case of gravitational

Card 2/5 waves. As is well known, in the usual formulation of

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the problem, gravitational waves are certain to appear only in the linear weak field approximation. Recent work (Papapetrou, Ref 11) has shown that travelling gravitational waves are not possible in the general theory of relativity. Conversely, the conformal representation hypothesis leads directly to the wave equation given by Eq (2.10). The latter equation is rigorous and the most general within the framework of this hypothesis. If it is assumed that the distribution of matter in space is uniform, this equation is an exact solution which describes a set of plane waves. The velocity and direction of propagation of these waves are indeterminate since they depend on the choice of the wave vector k_μ. If one uses the assumption that space is isotropic, which follows from the very formulation of the problem, one may assume that all the directions of the vector k_μ are equally probable. In that case all space may be

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of the above period (approximately 2 x 10^{10} light years) cannot be detected by astronomical observations. Similarly, causally connected events 2 x 10^{10} years apart are separated by the barrier $g_{44} = 0$. There are 11 references, 6 of which are Soviet and 5 German.

ASSOCIATION: Krasnodarskiy institut pishchevoy promyshlennosti (Krasnodar Institute of the Food Industry)

SUBMITTED: March 24, 1959

Card 5/5

Conformal Representation in the General Theory of Relativity and Certain Problems in Cosmology

likened to a liquid of infinite dimensions in which standing waves are set up along mutually perpendicular directions ("gravitational strata"). The dimension of a single "cell" in such a periodic structure is equal, to within an order of magnitude, to the dimensions of the "whole" closed world which is obtained in the various modifications of the general theory of relativity. There is an analogous correspondence between the period of changes in the metric properties at a fixed point and the "lifetime" of the universe, independently of assumptions about the direction of the vector k_μ In fact, the space periodicity is found to be of the order of 4×10^{10} light years and the lifetime is 4×10^{10} years (mean density of matter is assumed to be 4×10^{-29} g/cm^3). Observers located in different cells cannot exchange signals since they are separated by a region of space with $g_{ik} = 0$. It follows that material objects at a distance greater than one half

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S/0129/64/000/001/0076/0080

ACCESSION NR: AP4020300

AUTHOR: Pugachev, Ya. I.

TITLE: Generalized Lorentz conditions for a spherically symmetric gravitational field

SOURCE: IVUZ. Fizika, no. 1, 1964, 76-80

TOPIC TAGS: gravitational field, covariant tensor, harmonic condition, Rieman space, subsidiary condition, Lorentz condition

ABSTRACT: The generalized Lorentz conditions are considered in detail for a spherical coordinate system of the form

$$ds^2 = -f_1 dr^2 - f_2 r^2 d\Theta^2 - f_3 r^2 \cdot \sin^2\Theta d\varphi^2 + f_4 dt^2.$$

The mapping between a plane and Riemanian space is represented by

$$h^{\alpha}_{\beta} = \delta^{\alpha}_{\beta} f_{(\alpha)}, \quad \text{i.e. } h^1_1 = f_1, \quad h^2_2 = f_2$$

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ACCESSION NR: AP4020300

Using the covariant harmonic condition of De Donder-Fok

$$\overset{0}{D}_\nu \left(\sqrt{g/\overset{0}{g}}\, g^{\mu\nu}\right) = 0,$$

leads to a set of differential equations in r, ϑ, φ, and t, the first of which is

$$\frac{\partial}{\partial r}\left(Jr^2/f_1\right) - rJ\left(\frac{1}{f_2}+\frac{1}{f_3}\right) = 0,$$

which, for J = 1 and the Schwartzchild assumption $f_2 = f_3 = 1$, leads to a solution different from that given by Schwartzchild. It is shown that the general covariant formulation of subsidiary conditions emphasizes the independence of the subsidiary conditions from the coordinate system selected and makes the classical Schwarztchild solution comparable to the hormonic condition of De Donder-Fok. Orig. art. has: 20 equations.

ASSOCIATION: Krasnodarskiy politekhnicheskiy institut (Krasnodar Politechnical

Card 2/3

PUGACHEV, Ya.I.; SHIROKOV, M.F.

Role of the gravitation field in the formation of electron masses. Zhur.eksp. i teor.fiz. 24 no.4:375-382 Ap '53.(MLRA 7:10)
(Electrons) (Gravitation)

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ACC NR: AP6009144 SOURCE CODE: UR/0139/65/000/005/0015/0018

AUTHOR: Pugachev, Ya. I.

ORG: Krasnodar State Pedagogical Institut (Krasnodarskiy gospedinstitut)

TITLE: Approximate theory of the red shift in a conformally plane space

SOURCE: IVUZ. Fizika, no. 5, 1965, 15-18

TOPIC TAGS: cosmogony, gravitation red shift, Riemann space, conformal transformation, space matter

ABSTRACT: This is a continuation of earlier work by the author (Izv. vuzov SSSR, Fizika, no. 1, 46, 1960), where an exact solution of Einstein's equations was obtained by using the conformal correspondence between the sought Riemannian and known flat spaces, and by assuming uniform distribution of matter in the universe. In the present article the author develops an approximate theory of the red shift of spectral lines for the gravitational field described by the

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ACC NR: AP6009144

conformally-flat space. This phenomenon is interpreted as being the consequence of different values of the gravitational potential in different points of the field, and is not connected with the real motion of the radiating bodies. The analysis not only confirms all the results of the theory of the expanding universe, but leads to some new results. For example, the numerical value and even the sign of the Hubble coefficient can depend on the coordinates of the observer and of the observed object, and also on the direction of the line joining them. An analysis of this dependence would make it possible in principle to determine the position of the observer relative to the spatial node of the metric wave. A lower limit of 1.3×10^{10} years is obtained for the epoch on the basis of the calculations. It is concluded that the inhomogeneity of the gravitational field, defined by the conformally-flat space, is in some disagreement with the initial premise that the matter is uniformly distributed, although this does greatly affect the results. Furthermore, the results of the present paper can be used as an additional explanation of the Hubble effect. Orig. art. has: 16 formulas.

SUB CODE: 20/ SUBM DATE: 04Feb64/ ORIG REF: 008/ OTH REF: 001

Card 2/2

KALITSUN, V.I.; PUGACHEV, Ye.A.

Experimental study of precast troughs of sewerage structures. Sbor. trud. MISI no.42:53-65 '62. (MIRA 16:6)
(Sewage--Purification) (Precast concrete)

PUGACHEV, Ye.M., kandidat filosofskikh nauk (Staryy Oskol).

[redacted] Great law of nature. Nauka i zhizn' 24 no.3:36-39 Mr '57. (MLRA 10:5)

(Force and energy)

PUGACHEV, Ya.N.

General covariant variational principle in the theory of tensor fields of arbitraty whole rank. Trudy KIPP no.16:27-31 '57.
(MIRA 12:7)

1. Krasnodarskiy institut pishchevoy promyshlennosti, Mekhanicheskiy fakul'tet, kafedra fiziki.
(Absorption of light)

PUGACHEV, Ye.A., inzh.

Property of sediments of sewage purification installations to absorb some radioisotopes. Vod.i san.tekh. no.4:10-11 Ap '65. (MIRA 19:1)

PUGACHEV, Ye.A., inzh.

Deactivating capacity of purification structures. Vod. i san. tekh. no.12:13-14 D '62. (MIRA 15:12)
(Radioisotopes)
(Sewage—Purification)

L 46991-66 EWP(j)/EWT(m)/T/EWP(t)/ETI IJP(c) RM/JD/WB

ACC NR: AP6022870 (N) SOURCE CODE: UR/0303/66/000/002/0044/0046

39
B

AUTHOR: Oslopovskiy, B. A.; Pugachev, Yu. B.; Medvedeva, T. I.

ORG: none

TITLE: Testing of paint-and-varnish coatings for protection of equipment from corrosion

SOURCE: Lakokrasochnyye materialy i ikh primeneniye, no. 2, 1966, 44-46

TOPIC TAGS: paint, varnish, protective coating, sea water corrosion

ABSTRACT: The feasibility of using paint-and-varnish protective coatings in units where water is boiled at reduced pressure at 45-50°C was studied by testing a series of paint-and-varnish coating systems in a vacuum boiler containing sea water. At the pressure in the evaporator (40 mm Hg), sea water boiled at 45°C. A large number of paint-and-varnish materials were tested by being deposited on St. 3 steel specimens which were placed in sea water in the evaporator, and kept there for 2700 hr (some of them for 300 hr in boiling water). The highest resistance was exhibited by coatings based on "liquid" Nairit, hot- and cold-cured epoxy coatings deposited on a zinc epoxy protective primer, and also coatings consisting of a mixture of epoxy resins and Kuzbass varnish or coal pitch. Orig. art. has: 2 figures and 2 tables.

SUB CODE: 11/ SUBM DATE: none/ ORIG REF: 011

Card 1/1 UDC: 667.657.27

KAUKHCHESHVILI, Ernest Ivanovich, kand. tekhn. nauk; PUGACHEV, Yu.G., inzh., retsenzent; GURFINKEL', M.A., inzh., retsenzent; RYZHOVA, L.P., red. izd-va; CHERNOVA, Z.I., tekhn. red.; VLADIMIROVA, L.A., tekhn. red.

[Hoisting and conveying devices for refrigeration shops] Gruzopod"emnye i transportnye ustroistva kholodil'nykh tsekhov. Moskva, Mashgiz, 1962. 176 p. (MIRA 15:7)
(Conveying machinery) (Hoisting machinery)

PUGACHEV, Yu. I.; RYIOV, V. S.

Separation of magnesium isotope in vacuum distillation.
Zhur. fiz. khim. 37 no. 3:691-693 Mr '63. (MIRA 17:5)

1. Akademiya nauk SSSR i Leningradskiy fiziko-tekhnicheskiy institut imeni A.F. Ioffe.

PUGACHEVA, A.A.,
B. A. KUDRYASHOV, Byull. Eksptl. Biol. Med. 11, 510-13
(1941)

PUGACHEVA, Antonina Aleksandrovna; PRIVEZENTSEVA, A.G., red.; PYATAKOVA, N.D., tekhn. red.

[Methods for the economic and statistical analysis of processes involved in the supply of materials and equipment] Metody ekonomiko-statisticheskogo analiza protsessov material'no-tekhnicheskogo snabzheniia. Moskva, Izd-vo "Statistika," 1964. 93 p. (MIRA 17:3)

FUDAKIEVA, A.A.,
[illegible]. A. [illegible], Bull. Eksp. Biol. Med. 11, [illegible]-101 (1941)

GRIGOR'YEV, N.N.; PUGACHEVA, A.I.

Building up a breeding stock of turkeys in Stavropol Territory. Ptitsevodstvo 9 no.10:30-32 O '59.
(MIRA 13:2)

1. Direktor Georgiyevskogo gosplemrassadnika, Stavropol'skiy kray (for Grigor'yev). 2. Starshiy zootekhnik Georgiyevskogo gosplemrassadnika, Stavropol'skiy kray (for Pugacheva).
(Georgievsk District--Turkeys)

PUGACHEVA, A.I. [Puhachova, A.I.]

Intraorganic anastomoses between the arteries of the human rectum and their plasticity in experiment. Dop.AN URSR no.5:673-677 '60. (MIRA 13:7)

1. Stanislavskiy meditsinskiy institut. Predstavleno akademikom AN USSR V.G.Kas'yanenko [V.H.Kas'ianenko].
(RECTUM--BLOOD SUPPLY)

PUGACHEVA, A.I.

Determining the dipole moments and relaxation time of oleic acid from solutions in dioxane and carbon tetrachloride in connection with G. V. Potapenko's theory. Uch. zap. MOPI 92:43-48 '60.
(MIRA 14:9)

(Oleic acid--Electric properties) (Dioxane)
(Carbon tetrachloride)