

CONTENTS & ABSTRACTS

APPROXIMATE SOLVING OF NONLINEAR PARABOLIC AND ORDINARY DIFFERENTIAL EQUATIONS AND APPROXIMATE CALCULATION OF FUNCTIONALITY OF QUALITY WITH KNOWN OPERATING INFLUENCES . . . 2
T.K. Yuldashev

The paper examines the problem of one-value solvability and approximate solution of a system of nonlinear partial parabolic and ordinary differential equations with initial value and boundary value conditions. The convergence of quality functional is proved. The formulas of approximate calculation of quality functional with known operating influences are given.

Keywords: parabolic equation, initial and boundary value conditions, optimal control, generalized solvability, functional minimization, approximate solution.

IMPLEMENTATION OF DIAKOPTICS METHOD FOR MODELING AND CALCULATION OF LARGE SCALE . . . 9
V.N. Gridin, V.I. Anisimov, S.A. Almaasali

The paper considers the diakoptical approach to serial and parallel computing processes for modeling large systems based on the mathematical description of the modeled system as a block-diagonal-lined structure. It is shown that this approach brings substantial gains as cost of RAM, and the speed of solving the problem. Possibility of parallelization of computational processes significantly accelerates the solution of problems on multi-processor computer systems and allows constructing of distributed simulation systems functioning in the Internet.

Keywords: diakoptics, simulation systems, bordered matrix, distributed systems, Internet-based technologies.

SUFFICIENT STABILITY CONDITION FOR CONTROL SYSTEMS WITH ONE-DIMENSIONAL FUZZY INFERENCE BLOCKS . . . 14
A.A. Uskov

The paper proposes sufficient condition for stability of closed control systems with one-dimensional fuzzy inference blocks. The cases of most common systems management algorithms of fuzzy inference – Sugeno–Takagi and Tsukamoto are given. The obtained results can be used in engineering practice in the development of fuzzy control systems of the class considered herein.

Keywords: fuzzy inference algorithm, fuzzy control, fuzzy control system, asymptotic stability, stability criterion.

ACTIONAL MODEL OF INFLUENTIAL USERS OF SOCIAL NETWORKS . . . 20
D.A. Gubanov, A.G. Chkhartishvili

The paper proposes a new approach to constructive definition of influential users of online social networks – actional model. In this approach, influence is calculated based on user actions and taking into account the preferences of the principal. The example shows how actional model can be used to calculate the influence of users of concrete social network.

Keywords: social network, actional model, spread of action in a social network, influence.

STATE-FINANCED MEDICAL ORGANIZATIONS AS A MEAN OF REGULATION FOR A PRICE AND REPUTATIONAL COMPETITION ON LOCAL MARKETS OF HEALTHCARE SERVICE . . . 26
G.L. Mirzoyan

A model of a local market of healthcare service is considered for the case of price and quality competition between state-financed and commercial medical organizations (the actions of the former are interpreted as a control parameters for the equilibrium actions of the latter).

Keywords: treatment-and-prophylactic institutions, quality and price competition, controlled Nash equilibrium.

OPTIMIZATION OF THE OBJECT MOVEMENT PATH ON THE PROBABILISTIC CRITERION IN THE MODE OF PASSIVE SONAR IN AN ANISOTROPIC MEDIUM . . . 31
A.V. Dobrovidov, E.L. Kulida, I.M. Rudko

The problem of an object route selection and a velocity profile in an anisotropic three dimensional medium of propagation is investigated. The object moves in a threatening environment when some observers located in preset area try to detect it. In this work the probability of object undetection through the whole route by any of the observers is selected as a performance of the object routing. The discrete optimization method of this performance founded on the dynamic programming principle is proposed provided that object movement time is restricted by known limit.

Keywords: object route, performance of object routing, probability of object undetection through whole route, anisotropic three dimensional medium, dynamic programming.

ENERGY FORECASTING METHOD FOR AIRCRAFT SAFE BRAKING . . . 38
A.M. Shevchenko, G.N. Nachinkina

A method for predicting the reachability of a terminal state at regular or emergency braking modes of aircraft is developed. The method is based on the energy approach to flight control. To improve the forecast reliability the method of algorithms correction is proposed. The simulation results have confirmed the suitability of early warning or notice the pilots about the possibility of continued safe braking on the runway. Such announcements may improve the situational awareness of the pilot and, thus, reduce the probability of erroneous actions of the crew.

Keywords: information support, energy approach, forecasting methods, braking mode.

THE CONTROL TASKS OF UNMANNED MULTIMODE VEHICLES MOTION . . . 45
A.S. Syrov, A.M. Puchkov, V.Yu. Rutkovsky, V.M. Glumov

The control features of contemporary unmanned vehicles motion are considered. Their trajectories are characterized by wide range of flight altitudes including the flight in rarefied atmosphere. This type of vehicles is related to a multimode dynamic objects with changing characteristics during the flight. A brief review of the adaptive methods which can be used in unmanned vehicle control systems is given. The peculiarities of jet and aerodynamic combined control for the regimes of planning and sustained flight are considered.

Keywords: unmanned vehicle, control algorithm, system of control and stabilization, adaptive control, regimes of motion, coordinated control.

GENERATION OF TRAIN ROUTES AT THE STATION . . . 53
S.A. Branishtov, A.M. Shirvanyan, D.A. Tymchenok

The paper studies the problem of search and selection of routes to develop an automated train control system at the station. Stations that have branched infrastructure are characterized by a lot of number of possible routes. The amount of computation when searching for routes is large. The paper describes the approach to solving the problem of amount of calculation by dividing the station into areas. The problem of finding places of cutset the rail network is set and the algorithm for its solving is proposed. The paper also considers the problem of automating the preparation and selection of route as well as represents the method for analysis of rail networks topologies and approach of algorithmization of control process of train and shunting work.

Keywords: organization of trains, rail network, routes of trains, cutset.

ECONOMICAL PULSE-WIDTH CONTROL AT UNLOADING A GYRO MOMENT CLUSTER OF MINI-SATELLITE ATTITUDE SYSTEM . . . 60
S.Ye. Somov

The paper shortly considers methods for modeling and analysis of stability and synthesis of digital and pulse-width control in linear stationary systems at a multiple discrete filtering of measurements and different types of a time delay. The paper presents the results on digital gyromoment control of a land-survey mini-satellite motion and on pulse-width control of magnetic and plasma drivers at the gyro moment cluster unloading which is economical with respect to energy and fuel expenditures.

Keywords: land-survey mini-satellite, pulse-width control, unloading.

EVERGETICS PROBLEMS . . . 69
V.A. Vittikh

Evergetics problems are formulated. It is postnonclassical incipient science of management processes organization in society. Evergetics focuses on the question of what tasks need to be fulfilled to regulate the problem situation in the society, in contrast to the classical management theory, which is looking for ways of solving these tasks. Among the most important problems taken into consideration are the problems of designing of the situation meaning communicative models, achieving mutual understanding and consensus by the heterogeneous actors, development of communicative actions support systems and the problem of dual interpretation of the social world.

Keywords: management processes, society, problem situation, cybernetics, values, postnonclassical science, evergetics, heterogeneous actor, intersubjectivity, communication, mutual understanding, consensus.