CONTENTS & ABSTRACTS

Furtat I.B., Tsykunov A.M.

The robust control problem for unsteady-state nonlinear in output objects under a priori, functional, and structural uncertainty is solved. In process of system operation, the order of its mathematical model can change in unpredictable way. The solution is based on the application of a robust algorithm enabling the compensation of this class of uncertainty. The control system's efficiency is proved, and the simulation results are included.

Keywords: robust control, nonstationary, nonlinear control plant, prior, functional, structural uncertainty, observer, Lypunov function.

Zhukov V.P.

The conditions under which the stability type of the equilibrium state of a Lyapunov-type random-order nonlinear dynamic system would not change under any relatively small linear or nonlinear perturbances of its right-hand member (roughness in the sense of stability type conservation). Nonlinear components of right-hand members of the original (unperturbed) system and nonlinear perturbances of those right-hand members are considered to belong to a wide class of nonlinear functions containing both analytic functions and various classes of nonanalytic functions. Sufficient and necessary roughness conditions are derived.

Keywords: nonlinear dynamic system, roughness, stability type.

Saraev P.V.

Optimal control of dynamic systems based on feed-forward neural network models is discussed. A multistep optimal control algorithm using direct propagation neuron network structure is developed. The algorithm takes uses the superpositional structure of a neuron network and into account the long-term influence of control signals on the controlled object. The algorithm can be applied commercial companies management.

Keywords: neural networks, neurocontrol, dynamic systems.

Mitrishkin Yu.V., Korostelev A.Ya.

The results of synthesis and simulation of system with a predictive model for plasma shape and current control in a tokamak are presented. The comparison against a system with an H robust controller in the feedback loop is undertaken. Some features of model predictive control application to the magnetic plasma control problem are discussed.

Keywords: model predictive control, robust control, feedback, system synthesis, modeling, plasma magnetic control, tokamak.

Kleschev A.S.

This is the second paper of the two ones dedicated to the concept of a computer supporting system for scientific research in mathematics. A model of intuitive proof and the requirements to support tools for researchers and knowledge integrators as well as to system processes are presented.

Keywords: interactive theorem proving, theorem proving by analogy, intuitive proof, correctness of intuitive proof, knowledge banks.

Leonov G.A.

The approaches to prediction and control based on generic instability mechanisms in dynamic systems are described. These approaches, developed within the framework of experimental mathematics presume the denial of any attempts to construct, identify, or analyze the approximate models of rather complicated real dynamic objects. Instead, attempts are made to gather same experimental data connected with real models and then use it for prediction and control design. The occurrence of instabilities comply with certain generic regularities, which taken into account result in certain general principles of the qualitative control theory.

Keywords: forecast, control, Klausewitz principle, "Master-slave" principle.

Bahtizin A.R.

The paper overviews Computable General Equilibrium (CGE) modeling as a new tool for quantitative estimations of the consequences of managerial decisions. It examines the advantages of this class of models as against other modeling techniques and dwells on calibration issues. Finally, the paper describes a quantitative tool, which was employed for the analysis of the relations between certain components of shadow economy and major macroeconomic indicators of Russia (e.g., GDP and consumer price index).

Keywords: computable general equilibrium models, managerial decisions, shadow economy.

Chkhartishvili A.G.

A game-theoretical model of reflexive decision-making is built. If a normal form reflexive game is repeated several times, some (or even all) agents may observe the results such as choices of opponents, values of goal functions etc., different from the expected one. In such case, the informational structure of the game is changed. The paper discusses three problems: informational structure, actions of the agents based on it, and informational structure transformation.

Keywords: reflexive games, informational equilibrium, informational structure transformation.

Pankova L.A., Pronina V.A.

A solution scheme for the problem of determining the sequence of capital maintenance of housing on the basis of multi-criterion optimization model and OLAP technology is proposed.

Keywords: housing, capital repair, multicriterial optimization model, Hierarchy Analysis Method, OLAP-technology.

Asratian R.E.

An approach to improving the efficiency of HTTP/SOAP interactions in global networks is proposed. The approach is based on establishing a tunnel between HTTP clients and HTTP servers to provide server-to-server interaction and server-to-server data routing, unauthorized access protection and conceptual tolerance to network connection breaks. The concepts of tunnel organization are described including the principles of tunnel's gateway operations.

Keywords: distributed systems, Internet technologies, network protocols, Web-services.

Aksyonova G.P.

The paper discusses the variations of a discrete device operation and of its built-in checking circuit at imperfect data processing and shows how the complexity of a built-in checking circuit changes hereby. The paper presents A block diagram hardware-integrated synthesis of a modulo 2 built-in checking circuit for both precise and imperfect data is presented.

Keywords: discrete device, built-in checking circuit, truth table, modulo 2 synthesis method.

Paveliev V.V., Paveliev S.V.

The paper offers a model for solving the problem of a dedicated data processing center protection against failures and accidents in geographically distributed automated system built with the help of global network channels. The model employs the method of vector stratification of multi-dimensional objects and risk analysis and management techniques.

Keywords: alternative choice, protection against failures and accidents, data processing, vector stratification, multi-dimensional object.

Inzhevatkin E.V., Negovorova V.A., Savchenko A.A., et al.

The problem of the onset and growth of solid tumors in homogeneous tissues, statistical distribution of tumors in an organism, as well as the possibilities of tumor growth control are studied in the context of a population model based on the phenomenon of local cell interaction. A method for estimating the effects of exogenic and endogenic factors on cancer risk is offered. The results of two experiments justifying theoretical predictions are included.

Keywords: population dynamics, cancer, tumor distribution, metastasis, threshold effects.