CONTENTS & ABSTRACTS

Belotserkovsky D.L.

The paper proves the theorem of enumeration of graphs in which after removing an arbitrary vertex or edge the diameter of the graph obtained does not exceed three.
Keywords: graph, degree of vertex, adjacency, Handshake's lemma, diameter, minimal number of edges, operation of duplication.

Anulova S.V.

At every moment the control acts on only one of the two coordinates of the random walk with a fixed impact. A strategy, optimal for a whole family of criteria (mean hitting time, probability of never hitting, and so on) has been found. Solving the Bellman equation has been avoided owing to favorable properties of the model: symmetry, monotonicity, decomposability. The model has arisen while studying economic problems.
Keywords: controlled random walk, Bellman equation.

Ashimov A.A., Borovsky Yu.V., Novikov D.A., Nizhegorodtsev R.M., Sultanov B.T.

The paper is devoted to structural stability of an economic system models with different combinations of economic parameter values. The efficiency of methods of parametric adjustment theory for development of market economy and multiple effects evaluation has been proved.
Keywords: mathematical model, weak structural stability, parametric adjustment, multiple effect.

Chebotarev P. Yu., Loginov A.K., Tsodikova Ya.Yu., Lezina Z.M., Borzenko V.I.

For a society consisting of two solidary groups of similar size, the social dynamics determined by voting in a stochastic environment is studied. Within the model of random walks controlled by voting, closed-form expressions for the increments of groups' capital as functions of groups' claim thresholds and the parameters of the environment are obtained. The voting procedure of the unanimous approval of proposals and that of the unanimous rejection of proposals are considered. The group claim thresholds that maximize the group capital and the capital of the whole society are determined.
Keywords: voting, social dynamics, political competition, two-party system, stochastic environment, random walks.

Ougolnitsky G.A., Usov A.B.

The paper proposes mathematical formalization of the ecology-economic objects control systems of the fan structure. The consideration is conducted on the example of the three-level models of the river water quality control systems. The methods of compulsion and impulsion are used as hierarchical control methods in these models. The algorithm of decision construction is specified, typical examples are given and comparative analysis of the received results is conducted.
Keywords: hierarchical systems, control, sustainable development, management methods, imitation.

Bessarabov A.M., Sofiev A.E., Kvasyuk A.V., Gafitulin M.Yu.

Theoretical foundations and information technology were developed for system analysis and optimal management of innovative budget financing of branch science organizations (on example of chemical industry). Development of determined evaluation methodology of innovative projects was carried out for the following interconnected directions: rating estimation of innovative potential of science organization-developer; complex estimation of project developers' creative group; estimation of economical effectiveness of competitive innovative projects.
Keywords: management of innovations, system analysis, information technologies, branch science, chemical industry.

Kornoushenko E.K., Lobko A.A.

Preceding part of this paper posed important problems concerning practical regression appraisal. The present part suggests heuristic procedures to cope with the two problems. The first one is connected with the choice of preliminary nonlinear transformation of quantitative attributes. The transformation method, which uses the notion "proximity of values" and allows to considerably improve the model quality is proposed. The second problem concerns the development of models with enhanced prognostic features, examined on a test sample. Several interconnected empirical procedures are suggested on training and control samples for consecutive selection of significant regressors to develop models with requested properties. Effectiveness of all described methods is demonstrated on the practical example of mass appraisal of land parcels in the Kaluga region of Russian Federation.
Keywords: data set, regression model, linearization, model prognostic quality, regressors selection.

Masolkin S.I., Promyslov V.G.

The modern APCS of big industrial plants including the nuclear power plants is constructed as distributed in function and facilities system. The system components are interacted between each other by means of the industrial network. The model of the APCS division and the method for calculation of worse network parameters have been developed on the base of the network calculus theory. Using this theory the maximum delay for signal propagation within a branch of APCS is computed for a given input parameters.
Keywords: modeling, network calculus, networks, nuclear power plants.

Olenev S.E.

The paper offers the mathematical model for estimation of output rates and forecasting time of reaching the planned labour productivity in the course of new technical equipment production.
Keywords: model, estimation, output rates.

Finyagina V.I.

For class of control problems in distributed parameter systems with mobile control actions the method called "Method of Substitution" for calculation of distributed controls in two-dimensional plants is presented.
Required temperature fields are given in the form of piece-constant functions in rectangular area. Approximation of these temperature fields is realized by means of quadric functions. Results of numerical simulations are presented.
Keywords: distributed control systems, mobile control, substitution method, temperature field on surface.

Alexandrov A.G., Khomutov D.A.

The properties of control systems with PI- and PID-controllers are considered. Dependence of the level of control error on external disturbances is obtained. The use of the PID-controller with higher derivatives of the control error in case the level of control error exceeds the allowable level is proposed. Additional data on the object required to determine the coefficients of the PID-controller is proposed to be obtained using frequency identification.
Keywords: PID-controllers, limited disturbance, frequency identification.

Gilimyanov R.F.

A path planning problem for a wheeled robot is considered. When robot follows a path in a manual mode, its positions are measured by a GNSS receiver and stored as a target path to be repeated in an automated mode. It is required to construct a trajectory that satisfies certain smoothness requirements and curvature constraints. Due to errors inherent in the data points, the shape of the curve approximating the desired path may turn out inappropriate, or even unacceptable, from the point of view of control. In the paper, a recurrent method for improving curvature of curves consisting of uniform cubic B-splines is proposed. The method can be applied to real-time processing of large-scale data under memory limitation.
Keywords: path planning, wheeled robot, GNSS navigation, data fitting, B-splines, curvature smoothing, fairing, sliding window.