CONTENTS & ABSTRACTS

The concept of mathematical modeling of corruption in hierarchical control systems is presented. The main theses of the concept are formulated. The definitions of main used notions are given. The series of gradually complicated models of the administrative and economic corruption are built and investigated for static and dynamic cases. The main dependencies of the corruption behavior are revealed. Possibilities of anti-corruption drive are described.

Keywords: hierarchical control system, corruption, optimization and game-theoretic models.

The paper derives a necessary condition for optimality in the form of the Pontryagin maximum principle for problems described by the system of difference and integro-differential equations of Volterra type. The singular in the sense of Pontryagin's maximum principle case is investigated.

Keywords: difference and integro-differential equations of the Volterra, stepwise problem, necessary conditions, optimality, principle of the maximum, singular control.

The paper formalizes the concept of goal and goal structure of complex poorly formalizable system from the position of system approach. The direct (local goals for a number of components) and reverse (formation of a set of components necessary to ensure the achievement of a fixed number of goals) problem of distribution of local goals component in the component structure is defined. The methods for solving direct and inverse problem for a group of mobile robotic systemsare described. The example demonstrating the applicability of methods of solution of local goals distribution problem in component structures of complex poorly formalizable systems is given.

Keywords: local goal, component, direct task allocation goals, inverse task allocation goals, complex poorly formalizable system, multi-agent technology, mobile robotic system.

Due to errors in business process development in contemporary computerized business process management systems there is a chance of unlimited growth of control flows number in business process instance that can lead to unjustified overload of computer system resources. The paper reviews the task of business process scheme analysis is in order to avoid such situation and proposes the algorithm of checking if there is a finite number of control flows.

Keywords: executable business processes, business process management systems, control flow, directed graph.

The gender segregation of various types — branch, professional, educational — persistently influences distinction of human capital development level of men and women. The paper presents the assessment of human development index indicators interconditionality, inequality-adjusted human development index and the gender inequality index for different countries and for Russia taking into account Russian peculiarities.

Keywords: gender equality, gender segregation, human development index, gender inequality index.

The paper considers solution of the European option calculating problem with quantile criterion in incomplete market with discrete time. The method of European option calculation is justified with respect to the quantile criterion regarding the worst measure. The justification is based on the S-representation of two payment obligations regarding the worst measure.

Keywords: European option, quantile hedging, minimax portfolio, incomplete market, S-representation.

The complex of mathematical models developed to monitor the effectiveness of the educational activities of higher school is presented. The heuristic algorithm for numerical solution of system of differential equations based on neural networks and Runge—Kutta 4th order method is proposed. A software module to automate the calculation of performance indicators is developed.

Keywords: higher school, monitoring of educational activities, performance indicators, mathematical models, software module.

The problem of coordination of social indicator values of region development and economic indicators of business units activity is considered. The formal statement of coordination problem is proposed, the complex of mechanisms focused on stimulation of business toparticipate in solving of regional social problems is developed. The distinctive feature of the proposed approach is consideration of different attitude of business units to solution ofregional social problems. The quantitative assessment is made via loyalty parameter.

Keywords: social and economic system, region, social indicators of region development, economic indicators of region development, coordination, mechanism, regulation, enterprises.

The model of risk management for a system of industrial enterprises-agents acting under control of the center is developed. Variants of system operation with and without consideration of stimulation of coordinated interaction of center and agents is considered. The model is tested for some type of functions.

Keywords: risk management, center, agents, system of enterprises, industrial risks

The paper sets the problem of commercial real estate management with consideration of consumer preferences. One of the essential characteristics of the problem is the consumer appeal of estate. The modified Huff model is proposed for estimation of the consumer appeal. Considering consumer preferences allows predicting the attendance of commercial real estate under different management actions. The accuracy of estate attendance forecast is compared for original and modified models on real data of two biggest malls of Perm city. The analysis shows that the accuracy of the modified model is higher, which determines the practical significance of the study.

Keywords: commercial real estate, property management, consumer preferences, consumer appeal, Huff model, qualitative model, complex evaluation mechanism matrix.