CONTENTS & ABSTRACTS

The paper considers issues of development and mathematical modeling of plasma position, shape and current magnetic control systems in T-15 tokamak. Two magnetic plasma control systems are considered: the two-cascade system with control channel decoupling, MIMO H_∞-controller at plasma vertical position pulse stabilization via the PWM element; and the control system based on state vector estimation in discrete time with state observer in the feedback loop. The operation of the second system is considered in two cases: with and without plasma vertical instability suppression loop.

Keywords: plasma, tokamak, feedback, control channel decoupling, H_∞ robust control systems, state observer, observer-based compensators, pole placement, linear-quadratic regulator.

Linear nonstationary discrete control systems with periodic interval constraints on the elements of system matrix are considered. The sufficient conditions for their robust stability are derived using the method of comparison with Lyapunov vector function of a special type. They are shown to be not only sufficient, but also necessary conditions if additional constraints are introduced. The results are generalized for the case of linear control systems with multifaceted periodic constraints.

Keywords: linear nonstationary discrete control system, periodic interval constraints, Lyapunov vector function, robust stability conditions, multifaceted periodic constraints.

The paper describes the problem of constructing interval estimates for unknown probability if there are indistinguishable results of experiments. Several techniques of solving this problem are proposed.

Keywords: confidence interval, indistinguishable set, probabilistic interpretation of indistinguishability.

A new approach to mass appraisal in cases when dependent variable contains an unobservable part (due to market immaturity) is proposed. The approach includes several important stages: a) construction of two models with required assessment quality and defined on the respective non-overlapping sets (classes); b) classification of assessed objects; and c) selection of appropriate model to assess each object. The approach allows to better use the market information and improves the quality of mass appraisal.

Keywords: regression model, *d*-vicinity, classification, accuracy, reliability, mass appraisal.

Problems of enterprise investment activity management and estimation of investment projects efficiency are considered. The methodology of construction of industrial-financial models is considered; review of the software used for their construction is presented. Analysis of development of software package family FR-INVEST developed in Institute of Control Sciences of Russian Academy of Sciences is provided.

Keywords: management of investments, planning and working out of business plans of investment projects, FR-INVEST software package.

The paper considers the problem of synthesis of optimal real time data processing modular system with «Client — Server» architecture on the basis of a computer network. The problem solution has the following features: to determine the response time of the system to the request the one have to take into account request delivery time from the user's computer («Client») to the «Server»; messages exchange time between «Client» and «Server» depends on the bandwidth of data channels and network traffic.

Keywords: data, system, computer network.

The method of estimation of broadband wireless network performance in road safety control systems is considered. The paper proposes and analyzes the model of tandem queueing network with correlated input and cross-traffic which adequately describes data transmission on the wireless channels using E-band millimeter waves and IEEE 802.11n channels. The algorithm to calculate the network performance characteristics is developed.

Keywords: road safety control automated system, multiphase stochastic model, MAP-input from RFID-readers and radars.

The problems of mathematical modeling of ixodes ticks population dynamics in ecosystems of the middle latitudes are considered. Characteristics of ixodes ticks populations spread in the ecosystems are investigated in the qualitative aspect. The cellular automata simulation model of ixodes ticks number dynamics is developed. This model allows investigating the effects of various environmental factors on the rate of population growth and dynamics of ixodes ticks distribution.

Ключевые слова: mathematical model, cellular automata, population dynamics, ixodes tick.

A method is proposed for on-board evaluation of capability and safety of flight trajectories of civil airliner, generated to resolve terrain conflicts. An on-board mathematical model of airplane is used for flight simulation. Parallel simulation of flights along various trajectories is used due to necessity to get results of trajectories evaluation with rate faster than real time operation. It is proposed to develop this technique for implementation in integrated monitoring and flight safety on-board system to provide pilots by integrated vision of flight situation and generate warnings and recommendations to prevent its dangerous evolution.

Keywords: flight safety, terrain, CFIT, flight envelope, control system, recommended trajectory, flight correction, on-board model, conflict detection and resolution.

Principles of improvement of launching vehicle «Souz-2» propellant flow control, providing increase of environmental friendliness of their operation by reducing the rest of ecologically unsuccessful component of fuel in launching vehicle tanks are proposed.

Keywords: propellant-consumption control, environmental friendliness of operation, drop of the remains of fuel.

Some results of computer modeling of a flexible spacecraft dynamics with low-frequency elastic oscillations of construction are presented. Three types of algorithms for gyro-force control of the spacecraft are considered: proportional, proportional-differential, and proportional-integrated. Areas of preferable use of these control algorithms (by criterion of control time minimum) are determined at change of the lowest frequency of construction elastic oscillations.

Keywords: flexible spacecraft, computer modeling, algorithms, gyro-force attitude control.

Some problems of feasibility of construction of intelligence theory on the basis of K.G. Joung's Analytical psychology are considered. The paper shows that mental functions offered by Young, can be interpreted with application of well formalizable functions of planning, identification, and information transfer.

Keywords: theory of intelligence, analytical psychology, planning, identification, information transfer.