CONTENTS & ABSTRACTS

The problem is investigated of robust control of linear systems with switching. It is noted that the aim is to design a control system providing the specified error of reference signal tracking for the arbitrary parameters from the class of possible values. Pointed out is that only scalar inputs and outputs of the system are accessible for measuring, while each subsystem is subjected to unmeasured limited disturbances. The algorithm is proposed that guarantees the required accuracy of reference signal tracking. The obtained results are illustrated by an example: the reference signal tracking in a system consisting of three subsystems.

Keywords: switched systems, robust control, Lyapunov function, reference signal.

This paper presents macroeconomic model of dynamics on the realistic input-output network. The distinguishing feature of the model is in taking into account imperfect competition in two markets: that of commodities and the labour one. The introduction of mechanism of imperfect competition allows to analyze the impact of both real and nominal shocks. It is shown that the response to real shocks is approximately the same as in perfectly competitive models previously described in the literature and determined with the PageRank centrality of the graph. The impact of the monetary shocks does not depend on PageRank, but these shocks can cause significant fluctuations of real aggregate indexes in the short run and can provide a possible explanation of sectoral evolution coherence.

Keywords: input-output network, imperfect competition, shocks, computer simulations.

The comparative analysis of econometric methods is conducted of detecting and dating financial market bubbles, based on modern approach to bubbles identification. Two methods are compared, based on defining financial bubbles as periods in which the price change dynamics is described as an explosive-type non-stationary process. The comparison is conducted with the use of Monte Carlo simulation results.

Keywords: explosive process, right-tailed unit root test, correlation coefficient, sequential analysis.

The article presents a method of non-parametric estimation of stochastic volatility and its comparison with other widely used algorithms in econometrics. The main advantage of this approach is the possibility to estimate the volatility in the case when its probability distribution is completely unknown. It is shown that the developed method has better characteristics in comparison with the known parametric algorithms, constructed on the basis of the GARCH model and the Kalman filter.

Keywords: stochastic volatility, nonparametric signal estimations, Kalman filter, GARCH, Taylor model.

This research is devoted to the investigation of the changes in the nature of the largest Russian banks' policies regarding the control of risks and capital adequacy caused by the implementation of the new international business standards. The dynamic analysis of indicators used by banks internally for the capital adequacy assessment was performed within this research. The arguments witness the real integration of risk management systems into general business strategy of banks were revealed. There was proposed and tested the method of target capital level forecasting that showed high forecast accuracy.

Keywords: risk management, strategy, efficiency, stability, profitability, capital adequacy, forecasting, Basel II, Basel III.

The features are considered and the formalized models are suggested of redundancy methods for online information backup in data processing systems, working on the basis of computer networks. The comparative analysis is performed of centralized and decentralized options of information redundancy. A comparative analysis of the three main strategies of information online backup is performed for the stationary and transient modes of computer network operation.

Keywoods: data processing systems, computer network, operative information redundancy strategies, centralized and decentralized information redundancy.

The problem is considered of how to simultaneously increase the number of system network nodes and the number of different paths between them (parallelism) only by adaptive routing with minimal network diameter increase. The problem is solved experimentally for a complete 2-dimensional multiring. On the basis of the experimental results, a 4-dimensional extended multiring is constructed containing a significantly larger number of nodes and having greater parallelism than the known networks with the same degree of network nodes.

Keywords: system-area networks, experimental research, complete multiring, generalized hypercube, number of network nodes, network parallelism, network diameter, network throughput, channel fault tolerance.

A genetic algorithm that builds an aircraft trajectory of required length is proposed taking into account the complex terrain when aircraft is maneuvering at low altitude. This algorithm is intended to make the on-board flight path safety system meet standards of separation from other aircrafts. Examples are given of the trajectories generated by the proposed algorithm.

Keywords: air traffic control, terrain relief, genetic algorithm, generation of trajectories, separation standards.

The article is devoted to the optimal design of complex technical systems with uncertain parameters. The technique for solving preliminary design problems under conditions of parametric uncertainty is described. The problem of optimizing the characteristics of a propulsion system for a supersonic maneuverable aircraft is solved, while fulfilling the basic requirements for the characteristics of subsonic flight under conditions of parametric uncertainty. To solve this problem, Liu's uncertainty theory is used, which allows to lead optimization models with uncertainty to models of mathematical programming. Computational effectiveness of the offered method is shown by comparison with the solution of this task by method of simulation modeling.

Keywords: preliminary design, epistemic uncertainty, uncertain programming models, deterministic equivalent, Pareto-solutions, supersonic cruising flight.

In a conceptual, informative key the depth bases of the theory of the active systems (TAS) are considered. The mediation of this theory which reflected real «chemistry» of the public relations is shown. Vectors of natural development of TAS and of control theory of organizational systems (CTOS) which became continuation and extension of TAS are specified. It is emphasized that CTOS accepted time calls: network structures, «Big Data», «Open data», continued the transformation necessary for organic synthesis of the modern practices both in applied mathematics, and in the humanities. It is specified that possibilities of a method of conceptual refinement and application interpretative-argumentative approach can promote development of epistemological and heuristic potential of TAS and CTOS.

Keywords: «chemistry» of the public relations, mediation approach, conditional and application-oriented formalism, method of conceptual refinement, interpretative-argumentative approach.