



# CONTENTS & ABSTRACTS

## DELAY IDENTIFICATION BY FINITE-FREQUENCY METHOD . . . . . 2

**D.V. Shatov**

Proposed is a method of delay identification for SISO linear plant. The plant is described by transfer function with unknown coefficients, has unknown delay and affected with unknown bounded disturbances. The identification method is based on the finite-frequency identification that uses test signal (polyharmonic function) to determine unknown plant transfer function coefficients and delay.

**Keywords:** frequency identification, time delay, lti-systems, bounded disturbance.

## OPTIMIZATION OF INTERACTION IN MULTI-AGENT CLOSELY CONNECTED SYSTEM «RETAILER — BANK — INSURER» . . . . . 9

**M.I. Geraskin, V.V. Manakhov**

Considered is the problem of concordant optimal planning of sales volume in multi-agent closely connected system «retailer-bank-insurer» for credit sales of non-food commodities by retail trade networks. The models and mechanisms of optimal planning of agents are formed, based on which their interests' concordance mechanism is developed. The concordant system plan modeling for real organizations in retail, bank and insurance business is conducted.

**Keywords:** retailer, bank, insurer, degreeed function of price, multi-agent closely connected system, model of the optimal planning, mechanism of concordance.

## STATIONARY INVENTORY CONTROL STRATEGIES IN LOGISTIC SYSTEMS UNDER INFLATION . . . . . 19

**S.S. Granin, A.S. Mandel**

The paper discusses potential use of optimal parameters in stationary inventory control strategies for design of inventory control rules in supply systems, active in real market. Far and short-sighted inventory control strategies are compared. Various approaches to design of optimal stationary control strategies are analyzed and compared. Comparison of the approaches as well as of their practical application is done. Reported are model evaluation results of optimal parameters in stationary inventory control strategies as a function of the market situation, in particular the inflation rate.

**Keywords:** inventory control, parametric strategies, comparative analysis, inflation level, simulation.

## INFORMATION-ANALYTICAL SYSTEM TO FORECAST THE FACTORS OF REGIONAL DEVELOPMENT . . . . . 25

**E.V. Kasatkina, D.D. Vavilova**

Article presents information-analytical system implementing the methodology of forecasting main social and economic indicators of a region, such as production factors (production capital and human capital of a region and investments into them), as well as gross regional product. All forecasting models, which are implemented in information-analytical system, describe the dynamics of regional economy and forecast the state of economic situation in region.

**Keywords:** information-analytical system, database, production factors, gross regional product, forecasting.

## EXTENDED MULTIRING OF DIAMETER 2 . . . . . 35

**V.S. Podlazov**

Properties and a building way of two-dimensional extended multiring with increased number of nodes and few independent channels are considered.

**Keywords:** system-area networks, two-dimensional multiring, diameter, quasifull graph quasifull digraph, symmetric block designs, self-routing paths, independent paths.

## FORMALIZATION ELEMENTS OF COMPLEX DYNAMIC SYSTEMS EVOLUTIONARY IMPROVEMENT ON THE BASIS OF INNOVATIONS AND RELIABILITY CONTROL . . . . . 41

**V.P. Ivanov, E.B. Kablova, L.G. Klenovaya**

Considered are the aspects of technical systems reliability and safety problem, connected with methods of production and manufacturing techniques. It is shown that the essential role in this problem solution is played by the evolutionary principle of complex systems improvement characteristics. Elements of evolution process formalization on a stage-by-stage realization of innovations based on the analysis of a system movements set are offered. The equation to characterize the system reliability level change taking into account functioning control of each new version is obtained.

**Keywords:** reliability; safety; technology of techniques of complex technical systems; evolutionary principle; improvement of the system characteristics.

## ADAPTIVE CONTROL SYSTEM OF HEAT TREATMENT OF STEELS . . . . . 51

**M.D. Klimovitsky, A.A. Larin**

Control object with distributed parameters is considered. The paper presents and analyses the structure of the adaptive control system, main components of which are the parametric identification in real time, the Kalman filter and the optimal linear-quadratic regulator.

**Keywords:** distributed parameters, variables parameters, parametric identification, filter of Kalman, optimal linear-quadratic regulator, synthesis, adaptive control system, heat treatment of steels.

## MARINE SAFETY ESTIMATION EXPERT SYSTEM BASED ON NEURAL FUZZY LOGIC NETWORK . . . . . 58

**V.M. Grinyak, A.S. Devyatitsilny**

The paper considers the problem of marine vessel traffic control. Information system model for marine safety estimation (ship collision avoidance) is proposed. System defines some alarm levels: «Green», «Yellow» and «Red». An alarm criterion is based on maneuver detector. If the ship is maneuvering its alarm level decreases. Mathematical model of position and velocity estimation, and two neural fuzzy network (ANFIS) configuration for alarm generating is proposed. The first neural fuzzy network is maneuver detector. The next (second) neural fuzzy network is alarm generator. Some results of experiments, such as numerical experiments for typical ships traces and field experiments for port water area vessel traffic are given.

**Keywords:** vessel traffic control, collision avoidance, trace, ship maneuver, neural fuzzy logic system.

## THE BASIC ALGORITHMS OF ADAPTIVE POSITION-TRAJECTORY CONTROL SYSTEM OF MOBILE OBJECTS . . . . . 66

**V.Kh. Pshikhopov, M.Yu. Medvedev, B.V. Gurenko**

The paper describes the algorithms of adaptive control systems for mobile object. The problem is positioning to point, assuming parametric uncertainty and unmeasured disturbances affecting the mobile object. Basic computation algorithms of control forces and moments are synthesized using the method of position-trajectory control. The structure and algorithms of adaptive position-trajectory system with the reference model are proposed. Carried out is the synthesis of adaptive regulator and stability analysis of the closed system. An example of the regulator synthesis is given and the simulation results for autonomous underwater vehicle are shown.

**Keywords:** position-trajectory control, adaptive control, mobile object.