CONTENTS & ABSTRACTS

Chukanov S.N., Ulyanov D.V.

The method for decomposition of the vector field of a dynamical system based on construction of homotopy operator is proposed. The vector fields of dynamical systems can be classified on the basis of SVD-decomposition of potential components of the vector field. The method of decomposition of dynamical system vector field is used to construct Lyapunov functions for control systems.

Keywords: vector field decomposition, control system, Lyapunov function, Hodge-Helmholtz decomposition, operator of homotopy.

Parsegov S.E.

The paper addresses the problem of row straightening of agents via local interactions. A nonlinear control protocol that ensures finite-time equidistant allocation on a segment is proposed. With the designed protocol, any settling time can be guaranteed regardless of the initial conditions. A robust modification of the control algorithm based on sliding mode control technique is presented. The case of multidimensional agents is also considered. The theoretical results are illustrated by numerical simulations.

Keywords: multi-agent system, formation control, nonlinear control, fixed-time stability.

Fedyanin D.N., Chkhartishvili A.G.

The paper analyzes the model of information control in network structures. The dependence of result of information control both on the level of awareness of the control body (centre), and on the influences of elements of the network structure (agents) is shown. The issue of efficiency of structures with regard to the center is studied.

Keywords: active network structure, influences of agents, incomplete awareness, information management.

Voronin A.A., Eliseeva M.V., Khrapov S.S., Pisarev A.V., Khoperskov A.V.

Cognitive analysis of eco-economic system «Volzhskaya hydroelectric power station — the Volga-Akhtuba floodplain», optimization model of flood regimen and game-theoretic model of economic agent control with the «pay for damage» mechanism are developed. These investigations are based on the results of simulations of surface water dynamics.

Keywords: eco-economic system, risk control, multicriteria optimization, hierarchical game.

Dranko O.I., Otarashvili Z.A., Sushkov D.V.

The formation of innovation projects program aimed at increasing of organization efficiency is considered. The cost of business is used as the efficiency criteria. The paper notices that modeling of target indicator and selection of the most influential factors provide purposeful forming of organization development activities.

Keywords: cost management, innovation program, active development, express technique.

Pustovoit K.S., Buhvalov N.Yu., Stolbov V.Yu., Gitman M.B.

The problem of an enterprise management as an open production system with a given planning hierarchy is analyzed. Based on an entropy approach different degrees of openness in production planning systems are proposed. It is shown that the higher the degree of openness, the more prepared to self-organization the system should be on all structural levels of managerial decision making. An assessment of the degree of openness, defined by the frequency of production replanning, is discussed.

Keywords: open production system, entropy approach, production planning, self-organization, level of openness.

Podlazov V.S.

The paper considers concurrent execution technique of multipoint transfer «all-to-all» in full distributed switches for massive parallel multiprocessor computers.

Keywords: massive parallel multiprocessor computer, arbitrary permutation of data packages, parallel nonblocking self-routing, full distributed switch, symmetric block design, multipoint transfer «all-to-all».

Rusakov S.V., Chirkov M.V.

The paper deals with the model of immunotherapy effect on the dynamics of immune response. This model is based on the simplest mathematical model of infectious disease. The problem of discrete adaptive control is stated, and the algorithm for its solution is proposed. The results of numerical simulation of the problem are presented.

Keywords: mathematical model, adaptive control, immunotherapy.

Pleshkova Ju.A., Likhter A.M.

The paper considers modeling of behavior of insects using the optical filtering. The model of the process of the optical information transfer of different classes of insects, which takes into account the noise from natural and artificial sources of electromagnetic radiation in the optical range, as well as the influence of the mode of natural light at different times of day and year, geometric parameters and characteristics of the topography on the energy and information characteristics of information transfer process is considered. To increase the amount of transmitted information and, as a consequence, improve control efficiency it is proposed to use an external (optical) filtering.

Keywords: optical radiation, communication, insects, optical filtering.

Bronevich A.G., Karkishchenko A.N., Umansky V.I., Yakushev D.A.

The paper considers a method for recovering the geometrical form of cross-wise roadbed profile using the scanned data based on estimating piece-wise linear trends of a random series. The breakpoints are identified by analyzing local maximums of the introduced discriminant function. For eliminating «false» local maximums the transitive closure of discriminant function is used. The discrete and continuous realizations of the proposed method are described.

Keywords: roadbed, cross-wise profile, scanned data, random series, likelihood ratio.

Shevchenko A.M., Solonnikov Ju.I., Nachinkina G.N.

The algorithmic method for estimation of current and forecasting of future aircraft movement is proposed. The method is based on the energy approach to aircraft flight control. On the basis of the derived estimates the aircraft position on a runway is calculated, from which it is possible to achieve steady flight speed and raise sufficient height for overcoming high-altitude obstacles. The results of modeling of the passenger aircraft takeoffs with various gross weights and presence of obstacles at different distance from a runway end are given.

Keywords: flight control, takeoff, energy approach, decision making.

Tarasov N.N., Tahtamyshev M.G.

The paper considers the filtration algorithm which feedback uses not only current residuals but also their integrals. It is shown that the integral residuals allow to derive unbiased estimates of phase coordinates even under unknown perturbations.

Keywords: mathematical models of motion and perturbation, Kalman filtering algorithms, integral of the residual, unbiased coordinates estimates.