CONTENTS & ABSTRACTS

Ismailov I.G.

A mathematical model of non-stationary communication network systems is suggested.

Keywords: non-stationary communication network system, optimal control, optimality conditions.

Sedova N.O.

Some asymptotic stability results for continuous systems are presented. The systems are controlled with piecewise constant controls. The results are obtained on the basis of modification of the Lyapunov — Razumikhin technique. Illustrative examples are given.

Keywords: piecewise constant control, stability, stabilization.

Shubladze A.M., Modyaev A.D., Fedorov S.V., Kuznetsov S.I.

The paper proposes a variety of ways to solve problems of identification of parameters of aperiodic objects based on the formation of various control identification impacts. The problems have been solved for the objects whose behavior with sufficient accuracy approximated by the model, which is a series-connected n inertial links with a time constant T_1 and one inertial link with a time constant T_2, which is significantly greater than T_1.

Keywords: object identification, identification impact, derivative, integral.

Trachtengerts E.A.

The paper considers computer methods of manipulating the estimations of public opinion during polls, based on the principles of expected benefits theory, and in a situation of psychological traps.

Keywords: computer methods, public opinion estimations, polls, theory of expected benefits, psychological traps.

Amelina N.O., Lada A.N., Mayorov I.V., et al.

Different models of transportation are analyzed based on simulation of statistically significant flows of orders. Models include the rigid ones, where trucks return back to their garage after each trip, and more flexible ones, where trucks wait for new orders at the unloading positions, where they are allowed to delay trips, and finally where orders can be adaptively rescheduled «on the fly» in real-time and the schedule of each truck can be changed individually while executed. Diagrams are presented which show how profit of all trucks changes in time for each model. The profit dependencies on the number of trucks are built and analyzed. They show that it is possible to execute the same number of orders with less number of trucks using adaptive scheduling.

Keywords: multi-agent systems, adaptive scheduling, cargo transportation, simulation, real-time.

Khobotov E.N.

The problems of multi-item inventory control stipulating that demand is known are considered. The models and methods using piecewise linear approximation of inventory expense function for solving these problems are proposed.

Keywords: models, inventory control, software, demand, storekeeping, multi-item inventory.

Mandel A.S.

The author proposes a multi-stage procedure as a basis for a practical solution of the multi-item inventory control problem in the context of nonstationarity and lacking trustable information on statistical parameters of the demand. The main point of this procedure is that it starts with identification of the main trends covering seasonal components of the demand which are then used as a basis for solution of deterministic multi-item inventory control problem. At subsequent stages solutions are studied for the problem of generating additional orders for inventory replenishment (safety stock) to make up for random deviations of the demand from the identified trends (considered in Part II).

Keywords: inventory control, conditions of uncertainty, nonstationarity, classification of inventories, forecasting, expert-statistical approach, analogue method.

Pankova L.A., Pronina V.A., Kryukov K.V.

The paper proposes and examines ontological models of search for experts on the basis of thematic proximity against the query in the form of text document, based on the models of pattern text search.

Keywords: knowledge management system, search models, ontology, semantic proximity, specialist profile, thematic mapping.

Spiro A.G., Dorofeyuk J.A.

The paper considers the structural graph model of the stock market — digraph, each vertex of which is one of the possible states of the stock market, and weighted arcs represent the transition of the stock market from one state to another. Weight of the arc represents a measure of the «possibility» of such a transition. As a measure the transition frequency is used as the estimation of the corresponding probability.

Keywords: stock market, graph-structural methods, quoted price fractional variation, price gap relative value, tuple of binary variables, sliding window of specified length, type structure of the stock market, transition probability matrix, matrix of transition frequencies.

Gilimyanov R.F.

A motion planning problem for a robot is considered. When robot follows a path in a manual mode, its positions are measured by a GNSS receiver. To repeat this trajectory in the automated mode, it is required to construct a geometric path that satisfies certain smoothness requirements and curvature constraints. The paper proposes a component-wise method for improving curvature of 3D path consisting of uniform cubic B-splines. The discussion is illustrated by numerical examples of application of the proposed method to real vehicle and helicopter trajectories measured by a GNSS receiver.

Keywords: path planning, 3D path, unmanned autonomous vehicle, unmanned aerial vehicle, GNSS navigation, data fitting, curvature smoothing, fairing, B-splines.

Letunov D.A., Kizimov A.T., Lebedev M.A.

Autopilot with inertial strapdown attitude and heading reference system, providing efficient stabilization of a lightweight unmanned aerial vehicle in turbulent atmosphere, is considered. Aircraft roll transfer and frequency transfer discrete and continuous functions are presented. Aircraft roll frequency characteristics and oscillation spectrums are investigated.

Keywords: autopilot, lightweight unmanned aerial vehicle, attitude and heading reference system, transfer functions, frequency characteristics, spectrums.