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CONSIDERATION OF SYSTEM UNCONTROLLABILITY FOR FAULT DIAGNOSIS PROBLEM SOLUTION 2

Zhirabok A.N., Bobko Ye.Yu., Varnakov A.I., Pisarets A.M.

The problem of fault diagnosis for uncontrollable dynamic systems described by nonlinear models is studied. The method taking into account uncontrollability that allows to decrease the dimension of diagnostic observers is suggested.

Keywords: nonlinear systems, uncontrollability, diagnosis, observers.

ACTIVE PARAMETRIC IDENTIFICATION OF GAUSSIAN DISCRETE SYSTEMS BASED ON THE TIME DOMAIN LINEARIZATION AND OPTIMAL CONTROL 9

Chubich V.M., Chernikova O.S.

Some theoretical and applied aspects of active parametric identification of Gaussian nonlinear discrete systems based on the time domain linearization and optimal control have been considered for the first time. Original results are obtained for the case when parameters of mathematical models to be estimated appear in the state and control equations, as well as in the initial condition and covariance matrices of the dynamic noise and measurement errors. The example of optimal parameter estimation for one model structure is given.

Keywords: linearization, nominal trajectory, parameter estimation, maximum likelihood method, optimal input signal design, Fisher information matrix, optimal discrete control, Shatrovsky method.

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Kornoushenko E.K.

The following control problem for nonlinear normalized models is considered: the nonlinear model have to be moved from one steady-state to another, using constant inputs so that model outputs should change in specified directions. The linear approach is used to solve this problem. If the model is in some steady-state, an auxiliary linear system having the same steady-state is constructed, and original control problem is solved for steady-states of this linear system. Sufficient conditions of fitness of linear control obtained by ordinary least squares are formulated for solving original control nonlinear problem.

Keywords: nonlinear normalized model, steady-state, auxiliary linear system, partially monotone model.

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Epifanov A.S.

The paper gives the analysis of efficiency of application of classical methods of Newton and Lagrange interpolation in relation to the laws of functioning of discrete determined dynamic systems (automatons), presented in partially set geometrical images in the form of numerical schedules. Geometrical images of automatons of classes (4,2,2)-automatons, (8,2,2)-automatons, and (16,2,2)-automatons 254 signs long are considered. Efficiency of regularization of laws of automatons functioning is investigated for various number and choice methods of interpolation units.

Keywords: discrete determined automaton, geometrical image of laws of automaton functioning, interpolation.

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Dudarenko N.A., Poljakova M.V., Ushakov A.V.

The paper considers the issues of formation of degeneration functionals for complex technical system components which vector-matrix description contains interval parameters. Designing of degeneration functionals is carried out by means of functions of parametrical sensitivity of the elements of algebraic and geometrical spectra of system criterion matrixes. Thus the authors use the special form of representation of interval system parameters.

Keywords: interval system parameter, vector-matrix representation, complex dynamic system, estimation relative intervality, bracket of degeneration functionals.

MODELS OF AGENTS OPINIONS CONTROL IN SOCIAL NETWORKS 37

Zuev A.S., Fedyanin D.N.

The paper discusses the group of optimization problems in social networks control, assuming that agents' opinions have restrictions. Known methods of these problems solution are specified, corresponding mathematical models with differences from known models are offered, aspects and restrictions of their possible application are presented.

Keywords: social network, agents' opinion, influence.

THE APPLICATION OF RESOURCE NETWORKS FOR MODELING OF DISTRIBUTION OF SUBSTANCES IN AN AQUEOUS MEDIUM 46

Zhilyakova L.Yu.

The model is based on a resource network which topology is represented by a regular two-dimensional grid. The amounts of substance in given areas are assigned to the vertices; weights of edges correspond to flows between these areas. The model simulates the distribution of a substance in a specified area of water within a specified time interval.

Keywords: resource network, hydrological model, flows, lag effect, control.

EXPLORING THE EXISTING APPROACHES FOR EVALUATING THE QUALITY OF UNIVERSITY COURSE TIMETABLES AND DESCRIPTION OF THE NOVEL MULTI-CRITERIA APPROACH BASED ON FUZZY LOGIC 52

Bezhinov A.N., Tregubov S.Yu.

The paper explores problem of evaluating the quality of university course timetables. The first part of the paper is dedicated to the description of existing approaches to evaluating quality of timetable. The list of general limitations for the approaches considered is provided based on the analysis. Second part of the paper proposes the novel multi-criteria fuzzy logic based approach for the problem solving. The proposed approach has been successfully tested on real world timetabling problems.

Keywords: university course timetabling, evaluating the quality of timetable, fuzzy logic.

DIET RESTRICTION IN FRUIT FLIES: CONTROL AND MODELING 60

Novoseltsev V.N., Novoseltseva J.A.

The current opinion affirms that moderate caloric restriction in fruit flies increases life span. Nonetheless last years' experiments demonstrate that such an increase is obliged to component content of the diet but not to its caloric content. A hypothesis is put forward in this paper that under caloric restriction in an organism, the energy arrival decreases so that the stationary state is upset and must be restored. To achieve this, control mechanisms are involved. Reproduction is reduced, after which metabolism remodeling and increase of substrate output from the gastrointestinal starts. The increase of life span can be just a side effect of these control processes.

Keywords: caloric restriction, diet restriction, component content, life span, reproduction, control, modeling and simulation.

FUZZY FINITE STATE MODEL OF INTELLIGENT MULTIMODAL INTERFACE 69

Devyatkov V.V., Alifimtsev A.N.

The method based on fuzzy set of interacting finite automata for multimodal intelligent user interface with the environment in the process of dynamic situation recognition is proposed. The finite automates are used to define the relations between the modal objects used in the process of a multimodal interface with the environment, relations between multimedia objects of the environment and relations between modal and multimedia objects.

Keywords: modality, intelligent multimodal interface, multimodal model, multimedia model, fuzzy finite automata, dynamic situation recognition.

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