CONTENTS & ABSTRACTS

Recent foreign and domestic studies in sociophysics (a new field of physics that analyses social processes) are discussed. Topics presented in previous chapters include the influence of climate and solar activity on historical events, and dynamical processes in systems of «living» particles (Part 1), structure and dynamics of networks of social interactions and physical description of economic phenomena, i.e. econophysics (Part 2). In the (last) Part 3, mathematical modeling in sociology and political science is briefly reviewed, including the models originated from biophysics and physics of magnetic phenomena. Several formal models of such disciplines neighboring to «physics of society» as computational linguistics, demography, and mathematical history, are briefly considered. We discuss the linkage of sociophysics to the physics of non-living complex systems, as well as practical applications and possible future development of this new field of science.

Keywords: interdisciplinary physics, modeling of social systems, sociophysics.

The paper considers the problem of identification of parameters of linear dynamic plant under conditions when just the output signal is measured and no prior information about the disturbances is available. The modification of the known state-variable filter method is proposed. This modification allows to choose the filter parameters in the optimal way based on the experimental data. The proposed method is compared with the instrumental variable method. The results of numerical simulation of identification of the plant with the known true values of parameters as well as the results of identification of the drive with multi-mass load are given.

Keywords: identification, optimization, state-variable filter, drive with multi-mass load.

The human immunodeficiency virus infection, that causes Acquired Immune Deficiency Syndrome (AIDS), is a dynamic process that can be modeled via differential equations. The paper introduces a methodological problem of use of modern mathematical and information methods to boost the response of the immune system by means of drug scheduling. The control purpose is to steer the system to an equilibrium condition, known as long-term nonprogressor, which corresponds to an infected patient that does not develop AIDS symptoms. To show the feasibility of the control methodology a human immunodeficiency virus model computer simulations are presented.

Keywords: nonlinear continuous dynamic systems, differential games, guaranteed control, mathematical models of HIV-infection.

The structure of a safe order of investor in American style auction under inexactly known goal of operating party is found. A model is constructed that gives an example of model in new class of games with uncertainty in goals of players.

Keywords: multicriteria problem, game with uncertainty in goals, model, financial market.

The paper is devoted to elaborating and regressional analysis of power and power-exponential productive functions describing long-run economic growth in the contemporary macrosystem of Ukraine. Capital, labour and information are considered as the main factors of production that permits to obtain some estimations of the contribution of information factor to economic growth. The special attention is paid to lag models evaluating the lag impact for involving factors of production. There were drawn some conclusions on the character and sources of economic growth in contemporary Ukrainian economy.

Keywords: productive function, three-factored regressional models, economic growth, lag models.

The system of budgets that is developing in the budgeting process should be associated with the items of financial structure. In the process of budgeting in multilevel structures there is a problem of budget plan concordance between different levels that, in case of sufficient independence of subsidiary financial structure elements, can lead to the problem of objectives matching between different elements of financial structure. The paper considers the problem of coordinated budget plan construction for multilevel financial structure.

Keywords: budgeting, administration, active systems theory, hierarchical control.

The paper considers the problem of manned aircraft control in the process of carrying out various flight missions. The main control schemes that are needed for airborne survey purposes are highlighted. The review of existing aircraft manning control systems for flying along program paths is given. A comparative analysis of modern control schemes is presented. The results of software system development and its use in airborne surveying are also given. Key issues concerning the control algorithms implementation are considered.

Keywords: airborne surveying control, trajectories planning, control modes switch, satellite navigation system.

The paper previously published in the present journal containing a counterexample for the Analytic Hierarchy Process (AHP) is considered. The authors aimed at demonstrating the inconsistency of AHP theoretical framework. Analysis of this example, carried out in the present study revealed a mistake in the way the authors used AHP tools, that makes their assertion of AHP inconsistency invalid.

Keywords: multi-criteria analysis, analytic hierarchy process, relationships scale, the fundamental scale, intensity scale, preference, the theory of importance of criteria.