CONTENTS & ABSTRACTS

MEASURING HIGHER EDUCATION INSTITUTIONS'
EFFICIENCY: DATA ENVELOPMENT ANALYSIS
AND STOCHASTIC FRONTIER APPROACH 2

F.T. Aleskerov, V.Yu. Belousova, V.V. Petrushchenko

The paper deals with empirical studies to extent the concept of higher education institutions' (HEIs) performance, ways of adjusting data envelopment analysis models for heterogeneous sampling, reasoning for model input and output data selection, ways of increasing performance of HEIs. Attention paid to consistency and comparability of results obtained by different models.

Keywords: higher education institutions, data envelopment analysis, stochastic frontier, efficiency evaluation.

TRACKING SYSTEM FOR OBJECT WITH
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A.M. Tsykunov

The problem of robust tracking a reference signal was solved for object with the distributed delay, affected by limited external disturbances, while the vector of state is measured with noises. The control algorithm is derived, allowing to receive an asymptotically exact estimation of interference sources and to compensate the external limited disturbances with demanded accuracy. Numerical examples and results of computer simulation are presented.

Keywords: robust control, vector of state, disturbance, the distributed delay.

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S.A. Krasnova, A.V. Utkin

Based on the principle of motions separation, methods for the synthesis of states observer with nonlinear corrective actions in the form of sigma functions are developed for nonlinear systems, operating under uncertainties. It is shown that for the systems, that can be represented in the regular form relatively to external disturbances, this approach allows to obtain current estimates of unmeasured state variables and external disturbances without expanding of dynamic order of the observer. It is possible because of the model that simulates the effect of external disturbances. Algorithms developed are used in a control system for induction motor with incomplete set of measuring units.

Keywords: nonlinear systems, states and disturbances observer, sigma-function, induction motor.

METHODS OF PREDICTIVE ESTIMATES
OF SOCIO-ECONOMICS NATIONAL SECURITY
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Rezchikov A.F., Tsvirkun A.D., Kushnikov V.A., et al.

A complex of system dynamics models is developed for forecasting main indicators of Russia's socio-economic development with an impact on national security. Graph of cause-and-effect relations between indicators under study is taken as a basis for constructing the complex of mathematical models. Based on it the system of non-linear differential equations is built, allowing to analyze the state of Russia's national security. The analysis of ruble/euro rate impact on socio-economic national security indicators in Russia is carried out using the proposed complex of models.

Keywords: mathematical model, system dynamics, socio-economic development, indicators of national security.

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V.V. Breer, G.L. Mirzoyan, D.A. Novikov

A game-theoretical model of «innovational Cournot oligopoly» is considered to investigate the effects of competition on the innovative product market, of limited market capacity and of an optimal number of active agents existence, of innovative technologies complementarity, conformal behavior of the agents. Conditions for the basic scenario realization are obtained for the dynamics of the «endogenous» appearance and interaction between innovators and imitators.

Keywords: cournot oligopoly, competition on the innovational market, innovators and imitators, conformal collective behavior.

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A.A. Maslak, S.I. Moiseyev, S.A. Osipov

Derived and investigated in a simulation experiment are statistical characteristics of Rasch model parameters' estimates, obtained by using maximum likelihood and least squares methods. Comparative analysis of these two sets of estimates was carried out, showing that estimates, obtained by using least squares method, are closer to data generated. Specificity of estimates obtained by both ways is considered.

Missing data influence on precision of Rasch dichotomous model parameters calculation is determined.

Keywords: latent variable, measurement, Rasch model, precision of estimates, maximum likelihood, least squares method.

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Z.G. Rudenko

In this paper considered is a problem on composing an optimal portfolio of investment projects interdependent by effect. The proposed algorithm of finding an optimal solution for the problem is based on implementation of a network programming method. The algorithm work is demonstrated by the example.

Keywords: mathematic programming, project portfolio management, interdependent projects.

RISK MANAGEMENT METHODS IN MASS-MEDIA
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G.A. Shmatov

Article presents methods of a quantitative estimation of risks while placing an advertisement in mass-media. It is shown that the theory of media planning usage allows developing a technique of computing advertising placement risk, related to the failure of reaching an advertising impact required to solve the advertising problems.

Keywords: advertising, risk, media planning, optimization, efficiency.

OPTIMAL TRAJECTORIES FOR UNMANNED AERIAL
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USING LINEAR ANTENNA ARRAY 76

K.V. Andreev

Considered is a flight trajectory optimization problem for the unmanned aerial vehicle (UAV) that performs moving target tracking with linear antenna array by bearings observation. It is shown that bearing measurements accuracy is highly dependent on the antenna array orientation (mutual positioning of a target and UAV). This dependency leads to presence of «blind zones» — angles values with high range of measurement errors. Under such circumstances of observation an objective can be set to choose optimal (in terms of targeting accuracy) trajectories of UAV flight and to put additional restrictions on its maneuvering intensity. Optimal trajectories are calculated numerically as two-point boundary problem derived from Pontryagin's maximum principle.

Keywords: bearings-only measurements, Kalman filter, Pontryagin's maximum principle, degenerate problem of optimal control.