CONTENTS & ABSTRACTS

Pranghishvili I. V., Lototsky V. A., Ghinsberg K. S., Smolyaninov V. V.

An analytic review of identification research papers published in the Proceedings of the 2nd International Conference "System Identification and Control Problems" is offered. The basic concept is formulated as follows: identification problems should be studied in the context of human activities aimed at looking for the solutions to practical control tasks. The paper indicates the need in science-intensive methodologies for the initial phases of solving sophisticated non-standard problems with weakly formalizable conditions and stringent requirements to control performance (estimation and prediction).

Yashin A. I., Ukraintseva S. V.

Traditional demographic techniques of morbidity and mortality analysis in human and animal populations do not pay attention to the two important properties related to the interaction between the population and its environment. The first one is concerned with differing the chances for individuals to fall sick and to die. The second deals with the dependencies between the vitally important biologic characteristics (life span, the age of illness onset, etc.) of genetic relatives as well as of individuals sharing similar cultural and other living standards. The paper discusses the approaches to ageing and survival modeling where these properties are reflected in population dynamics. It also formulates several unsolved problems related to modeling and control under incomplete information. Finally, it discusses some promising biological hypotheses that can be studied with the help of novel models.

Novoseltsev V. N., Arking R., Novoseltseva J. A., Yashin A. I.

Interdisciplinary modeling and simulation of ageing and reproduction is presented. The paper describes a model where the individual ageing rate is proportional to the organism's oxygen consumption rate and its oxidative vulnerability. Ageing is understood as age-related decrease of the organism's ability to convert the substances got from ambient into energy. The models of oxidative stress and senescence-caused death allow constructing the general scheme simulating organism's life cycle. This scheme was used to analyze systemic mechanisms of reproduction and ageing in Drosophila and Medfly fruit flies.

Koltover V. K.

Despite the phenotypic variety, the aging of all organisms follows rather simple universal quantitative laws. First, each species is characterized by the species-specific maximal life-span potential, which is inversely related to the basal oxygen consumption (the so-called "Rubner scaling relation"). Second, the growth of mortality rate with age follows the extremes statistics. Usually, it is the so-called Gompertz law of mortality that has been confirmed both for people and for other mammals, flies, mollusks, etc. Free-radical hypothesis of aging explains the Rubner relation but it cannot explain the exponential growth of mortality with age. Against this background, the paper offers a framework of a universal aging theory based on the concept that all biological structures perform their functions with genetically limited reliability. It shows that the theory is, generally, capable to piece together and explain all quantitative mechanisms of aging.

Michalski A. I., Yashin A. I.

The paper notes that the available data about the factors affecting senescence and longevity processes enable to formulate the problem of controlling these processes at different levels: cells, organs, organism, population. The knowledge absorbed in biology, medicine, gerontology and demography should be generalized in a way to take into account the common features of the processes running in various-type systems. The paper analyzes the results of longevity experiments with C.elegans worms together with the data about human disability at advanced ages. Based on the results obtained, it offers potential ways to slow the aging and to increase the longevity.

Butov A. A., Volkov M. A.

Optimal control in the change-point problem as a model of energy production optimization in aging is discussed. The paper shows the multimodality of the objective function under some assumptions that causes the heterogeneity of the population in aging. Biological application of the model includes the analysis of distribution functions of stress times in aging.

Khalyavkin A. V., Yashin A. I.

Recent findings prove that anti-aging processes in cells can successfully counteract cellular deterioration. Some researchers agree with the view that the aging of the multicellular organism is rather a function of breakdown in integrative mechanisms than of fatal changes in individual cells. Why, in this case, does an organism composed of potentially ageless cells age? The answer may be found by taking into account the influence of all external factors that induce organisms to function in one physiological regimen or another. The paper shows that the effectiveness of the control systems to self-maintenance may depend not only on organism's structural or functional features but also indirectly on the external conditions in which it exists. It describes some facts that agree with the approach proposed.

Novikov D. A., Chkhartishvili A. G.

The paper reviews the game-theoretical models of reflexive decision-making. Most of equilibrium concepts used in the game theory require game parameters to be common knowledge, i.e. that all agents know it, all agents know that all agents know it, and so on ad infinitum. In the general case, the agents have different beliefs about beliefs of other agents; thus an infinite (reflexive) belief structure appears. For this case, the concept of informational equilibrium looks rational. The paper formulates the reflexive model and the conditions of the reflexive equilibrium existence and stability. It offers a solution to the reflexivity depth problem for some cases and adduces some examples.

Tolstykh A.V.

The paper discusses the problems of building the models of economic mechanisms of accident prevention in man-caused and natural disasters. The methods of safety control mechanisms analysis subject to decision-makers activities are described with the example of a linear mechanism of risk decrease fee.

Blyumin S. L., Shmyrin A. M.

The papers offers an approach to accounting the fuzziness of the state neightbourhoods of time-discrete systems and discusses how it agrees with the study of discrete Volterra and fuzzy systems.

Zhevnerov V. A.

An optimal load flow control procedure for the systems with repeated transmissions is offered. An example of ALOHA system with the most prevalent type of multiple access is adduced.

Kononov D. A., Kulba V. V., Shubin A. N.

The final part of the paper presents the results of formalizing some information actions typical for informational management. It offers some problem statements and discusses ways of their effective solution.

Epstein V. L.

The paper offers to create information retrieval abstracts digests on CDs in Web and to use them as a new communication tool on scientific journals market. Such digests help to expand the journal's readers community, improve its value and impact factor and can serve as promoter of innovations and scientific and technical communications in the target audience. They can be also sold at the scientific information market as a new information product.

Ishchenko A. A.

The paper outlines the prospect of interindustry cooperation of businesses in Rusiia. An electronic interindustry site is singled out as research object. The organization of such interaction and its main participants are described. The difficulties that hamper the expanding of interindustry business cooperation in Russia are discussed.