

SPECIAL ISSUE: EDITORIAL

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This Special Issue of *Kybernetika* consists of the papers of the theory of probability, mathematical statistics, non-classical approaches to the uncertainty (the fuzzy sets and quantum structures) and numerical mathematics. Most of the papers have been written by the scientists, which presented plenary lectures at the PRASTAN conference (Josef Štěpán, Jaromír Antoch, Jozef Komorník, Magda Komorníková, Gejza Wimmer, Andrej Pázman, Lubomír Kubáček, Beloslav Riečan, Milan Mareš, Angela Handlovičová, Štefan Varga).

Roughly speaking, the papers in this issue can be grouped into three parts. The first one consists of seven papers devoted to the theory of probability, random processes and mathematical statistics. A stochastic diffusion model for the spread of a susceptible-infective-removed Kermack–McKendric epidemic in a population, which size is a martingale N_t that solves the Engelbert–Schmidt stochastic differential equation, is proposed by J. Štěpán and D. Hlubinka. They prove theorems on a unique strong and weak existence of the solution to this stochastic differential equation and they also perform computer simulations.

The survey paper on testing a homogeneity of stochastic processes and on change point problem by J. Antoch and D. Jarušková covers rather a broad area. It starts with Poisson process and finally the estimations of the intensity of a Poisson process are studied. The goal of the paper presented by J. Komorník and M. Komorníková is to sum up a series of studies reached by the authors and some of their collaborators on regime-switching models. Special attention is paid to threshold variables, transition functions and their construction via aggregation operators. Some further problems related to testing adequacy are indicated and discussed.

The linear comparative calibration problem is presented by G. Wimmer and V. Vítkovský. They suggest an iterative algorithm for estimation the parameters of the analysis function (inverse of the calibration line), and the problem of deriving the approximate confidence region for the parameters is solved. The paper devoted to possible optimality criteria when the models are nonlinear and the observations are correlated is written by A. Pázman. Tests procedures for the cases that the covariance matrix is either totally unknown, or partially unknown (variance components), or totally known are given by L. Kubáček. A construction of approximate confidence intervals on the variance component in mixed linear models with two variance components with more than minimum observations available is considered and also

a small simulation study is provided by B. Arendacká.

The second group of three papers is devoted to the study of non-classical approaches to the uncertainty. A brief survey on some recent developments in the probability theory on tribes and MV-algebras is presented by B. Riečan. The survey concerns definitions and basic properties of probabilities (or states) and observables in more general structures: MV-algebras, IF-events, L-lattices. Another approach to the uncertainty is presented by M. Mareš in his survey paper. He summarizes the main fuzzy approaches to vague data processing, to discuss their main advantages and also their essential limitations, and to specify their place in the wide scale of information and knowledge processing methods effective for vague data. A straightforward generalization of the robust estimation of coefficients of classical regression model on a robust estimation of coefficients of fuzzy regression model and proves several simple assertions is proposed by Š. Varga.

Finally, the last group of papers is devoted to numerical mathematics and its applications. Z. Krivá and A. Handlovičová deal with the problem of image processing, filtration and image segmentation. They present efficient numerical schemes for solving the proposed problems, and also several useful numerical properties and computations are included. N. Dikoussar and Cs. Török present methods from finite element methods, spline interpolation, and nonlinear regression. The paper about one interesting approach to the piecewise approximation of functions with noise is given by Cs. Török and M. Révayová. The paper by S. Štastník, J. Vala and H. Kmínová deals with an interesting problem from civil engineering and the main topic is modeling of basic thermal technical characteristics of building materials. An effective numerical algorithm for solving such types of problems is also presented. The last paper by J. Šembera, J. Maryška, J. Královcová and O. Severýn is devoted to the very actual problem of modeling of groundwaterflow in fractured porous medium. Not only mathematical formulation of the problem but also numerical results are presented.

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