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## Preface

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**Biographical notes:** Vyacheslav V. Kalashnikov received his PhD in Operations Research (OR) in 1981 from the Institute of Mathematics of the Siberian Division of the USSR Academy of Sciences in Novosibirsk. He was awarded his DrSc (Habilitation degree) in OR in 1995 from the Central Economics and Mathematics Institute (CEMI) of the Russian Academy of Sciences in Moscow, Russia. He is author and co-author of four monographs and more than 60 papers published in many prestigious journals and publishing houses. He has advised ten PhD students and 25 Master students in the universities in Russia, Mexico and Ukraine.

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This special volume of the *International Journal of Knowledge Engineering and Soft Data Paradigms* includes two main themes: variational inequalities and complementarity problems, as well as their applications to economics and financial models.

The first group of the selected papers deals with variational inequality problems and their applications. The paper by I.V. Konnov studies a general problem of optimal allocation of a homogeneous resource (namely, the bandwidth) in a spatially distributed system (communication network), which is divided into zones (clusters) and each zone provides an auction for allocation of this resource. This approach leads to a two-objective optimisation problem, which involves non-differentiable functions whose values are computed algorithmically. The author suggests a decomposition algorithm to find a solution and describes an adjustment of this approach to bandwidth sharing in wireless communication networks. This method can serve as a basis for creation a decision making system for network managers and users of different levels.

The paper by V.V. Kalashnikov and N.I. Kalashnykova examines the conditions that guarantee the existence of a solution to the parametric nonlinear complementarity problem with a monotone (with respect to  $x$ ) mapping  $f: R^n \times R^m \rightarrow R^n$ . The authors study a Newton-like method and establish its convergence if the mapping  $f$  is strictly monotone and each of its components is a concave function. In addition to that, they prove that the sequence of approximate solutions converges to an optimal solution of the original problem at a quadratic rate.

The second array of works included in the special volume treat problems with uncertainty (fuzziness) of input data. An interesting application is described in the paper by O. Kosheleva dealing with the uncertainty analysis used in standardised tests in the USA where, in the last decade, standards have been adapted for each grade level. These standards are annually checked by state-wide tests. The results of these tests often determine the school's funding and even the school's future existence. Due to this importance, a large amount of time is spent on teaching to the tests. Most teachers believe that this testing approach is detrimental to student education. This belief seems to be empirically supported by the fact that so far, the testing approach has not led to spectacular improvements promised by its proponents. While this empirical evidence is reasonably convincing, the teacher community has not yet fully succeeded in clearly explaining their position to the general public because the opposing argument (of the need for accountability) also seems to be reasonably convincing. In this paper, O. Kosheleva shows that the situation becomes much clearer if one takes uncertainty into account and that, hopefully, a proper use of uncertainty can help in resolving this situation.

The article by V. Kreinovich argues that *dynamic fuzzy logic* leads to more adequate 'and' and 'or' operations. In the traditional (static) fuzzy logic approach, one usually selects an 'and'-operation (*t*-norm) and an 'or'-operation (*t*-conorm). The result of applying these selected operations may be somewhat different from the actual expert's degrees of belief in the corresponding logical combinations 'A' & 'B' and 'A'  $\vee$  'B' of the original statements since these degrees depend not only on the expert's degrees of belief in statements 'A' and 'B', but also in the extent to which the statements 'A' and 'B' are dependent. The author shows that dynamic fuzzy logic enables one to automatically take this dependence into account and thus, leads to more adequate 'and'- and 'or'-operations.

Finally, the paper by I. Mihus and S. Kavun analyses some crucial of national markets of securities. Since stock markets are integral and important parts of the financial system of many countries, the recent security transaction development entered into wide use, which in turn determines the number of problems faced by securities market participants. However, given the trend in the stock market and changes in the financial system of Ukraine in its security trading practice, there is an urgent need to identify the threats of data subjects and assess their economic sturdiness. The paper considers a specific impact on the decision to purchase securities on part of the stock market indexes, which in turn affect the economic security traders. Currently, no systematic approach to the formation of economic security traders and mechanism of indicator assessing its condition exists in Ukraine, which determines the relevance of the study.

In conclusion, on behalf of the authors, we would like to express our profound gratitude to Prof. Dr. Junzo Watada, without whose constant support and encouragement, as well as good advice, the volume could not be composed and edited. Especial gratitude is also due to the journal's Editor-in-Chief Dr. Mika Sato-Ilic for his crucial help in the volume arrangement and publishing. Finally, great thanks to the anonymous referees, whose valuable comments and suggestions have helped the authors a lot in improving their results and/or presentation style.