

Special issue: Applied mathematical programming and modelling 2016

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SPECIAL ISSUE: APPLIED MATHEMATICAL PROGRAMMING AND MODELLING 2016

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In order to cope with complex reality, we create its models. One can think of many ways in which reality can be modelled; however, choosing mathematics as a modelling tool brings many advantages. With it, we can be sure about the logical consistency and unambiguity of our model. We are also able to share our model with other people. We can process the model on a computer. Last but not least, we can often learn something new about reality from internal logic of the model. Therefore, mathematical modelling is of great importance.

The present special issue of *Kybernetika* is devoted to the conference titled “Applied Mathematical Programming and Modelling 2016” (APMOD 2016), which was held in Brno, Czech Republic, on June 8-10, 2016.

Two papers from this issue are theoretical. “On random processes as an implicit solution of equations” studies the existence and uniqueness of multi-dimensional random processes defined by functional equations. The paper “Multistage risk premiums in portfolio optimization” extends the concept of risk premium to the case when the portfolio may be rebalanced in time.

Two other papers concern “technology” of mathematical modelling. The article “Warm-Start Cuts for Generalized Benders Decomposition” proposes a novel solution technique for two-stage stochastic non-linear programs. “Stability, Empirical Estimates and Scenario Generation in Stochastic Optimization - Applications in Finance” investigates the relationship between stochastic problems and their empirical approximations.

The remaining works deal with mathematical modelling of concrete real-life problems. “Two-Stage Stochastic Programming Approach to a PDE-Constrained Steel Production Problem with the Moving Interface” presents a scenario-based stochastic program for the continuous casting problem that is subsequently solved using a modified progressive hedging algorithm. The paper “Which Carbon Derivatives are Applicable in Practice? A Case Study of a European Steel Company” applies the Mean-CVaR analysis to quantify the impact of emission trading on production of a steel company. “Second Order Optimality in Markov Decision Chains” details explicit formulas for calculating the variances in transient and discounted models for both finite and infinite time horizons and for the long run average non-discounted models. “Bottom-Up Modelling of Domestic Appliances with Markov Chains and Semi-Markov Processes” investigates applicability of random sequences, such as first and higher order Markov chains and semi-Markov pro-

cesses, for bottom-up electricity load modelling. “Nilpotent Approximation of a Trident Snake Robot Controlling Distribution” presents a modern cybernetics-related topic by constructing a privileged system of coordinates and a related algebraic approximation for the snake robot control. “Piecewise-polynomial Signal Segmentation Using Convex Optimization” solves a one-dimensional signal processing problem using a proximal splitting convex optimization method based on sparse modelling.

It is worth noting that seven papers of the special issue are related to the conference stream on stochastic programming, dedicated to the memory of professor Jitka Dupačová, who, unfortunately, recently passed away.

Professor Dupačová had been a pioneer of stochastic programming since the 1960s, published several books, over 150 papers, gave courses at various universities all around the world, was an excellent teacher and advisor, and led a seminar on stochastic programming for 30 years. She founded a new PhD study program in Econometrics and Operations Research, supervised many Masters and PhD students, some of who are still active the area. Last but not least, she was very active in creating and keeping international connections among researchers.

She kept working until her last days. In consideration of her merits in the development of stochastic programming, she was awarded one of twelve Memorial Plaques during the 10th Symposium on Stochastic Programming (2004) in Tucson, Arizona.

Thus, we will not exaggerate by saying that all the results from the seven papers mentioned above can, at least partially, be attributed to her efforts.

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editors of the special issue

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