SI “Deterministic and Stochastic Variational Principles and Applications”. December 2015

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Variational methods are important tools for deriving optimality conditions and corresponding algorithms for solving optimization problems. Ekeland’s variational principle is a deep assertion about the existence of an exact solution of a perturbed optimization problem in a neighborhood of an approximate solution of the original problem. The aim of this special issue was to discuss new variational approaches from the theoretical as well as computational point of view. Furthermore, we are interested in applications of the variational methods for deterministic and stochastic models, especially in approximation theory and optimal control.

In the special issue the importance of variational methods in optimization and stochastics is described. We present new developments on the field of deterministic and stochastic variational methods including applications in mathematics and economics.

Most of the papers in the special issue are dealing with optimal control and state estimates problems in the deterministic as well as stochastic case and maximum principles (Abdelmadjid Abba: On Mean-field Partial Information Maximum Principle of Optimal Control for Stochastic Systems with Lévy Processes, Vo Anh: Least-Squares Estimation of Multifractional Random Fields in a Hilbert-Valued Context, Brigitte Breckner: Multiple solutions of Dirichlet problems on the Sierpinski gasket, Ioana Ciotir: A variational approach to Neumann stochastic semi-linear equations modelling the thermostatic control, Csaba Varga, Hannelore Lisei: A multiplicity result for a class of elliptic problems on a compact Riemannian manifold, Tina Engler: On Investment Consumption Modeling with Jump Process Extensions for Productive Sectors, Diana

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Keller: Optimal Control of a Nonlinear Stochastic Schrödinger Equation, Angela Kunow: Optimal Exploitation of Nonrenewable Resources, Boris S. Mordukhovich: Optimal control of semilinear unbounded evolution inclusions with functional constraint, Bernt Øksendal: Malliavin calculus and optimal control of stochastic Volterra equations, Frank Wusterhausen: An Analysis of Path-dependent Options).

Recent developments in Convex Analysis, Variational Inequalities, Vector- and Set-valued Optimization are presented in the papers by Johannes Jahn (Vectorization in Set Optimization), Akhtar A. Khan (Existence Theorems for Elliptic and Evolutionary Variational and Quasi-Variational Inequalities), Juan-Enrique Martinez Legaz (Duality for closed convex functions and evenly convex functions) and Vicente Novo (Optimality conditions for quasi solutions of vector optimization problems).

Furthermore, optimization problems with uncertainties are discussed in the papers by Baasansuren Jadamba (On the Modelling of Some Environmental Games with Uncertain Data) and Elisabeth Koebis (On Robust Optimization—Relations Between Scalar Robust Optimization and Unconstrained Multicriteria Optimization).

We are very grateful to the authors who submitted their works to the special issue and to the referees for their detailed reviews.