Preface

The papers published in this volume focus on some of the most recent developments in complementarity theory, variational principles, stability theory of functional equations, nonsmooth optimization, and various other important topics of nonlinear analysis and optimization.

This volume was initially planned to celebrate Professor George Isac's 70th birthday by bringing together research scientists from mathematical domains which have long benefited from Isac's active research passion. Unfortunately, George Isac passed away in February 2009 at the age of 69.

George Isac received his Ph.D. in 1973 from the Institute of Mathematics of the Romanian Academy of Sciences. He made outstanding contributions in several branches of pure and applied mathematics, including complementarity theory, variational inequalities, fixed point theory, scalar and vector optimization, theory of cones, eigenvalue problems, convex analysis, variational principles and regularization methods, as well as a number of other topics. In his long and outstanding career, he wrote more than 200 papers and 13 books. Professor Isac was an avid traveler who visited more than 70 universities around the globe and delivered approximately 180 research presentations. He also authored seven books on poetry. During his scientific career he collaborated with numerous mathematicians. His research papers contain very deep, original and beautiful results. Through his significant contributions, he earned a distinguished position and became an internationally renowned leading scholar in his research fields. Professor Isac's prolific career was supported by the love and affection of his wife, Viorica. In fact her dedication, was so strong that she typed most of Isac's manuscripts for his papers and books. We offer our sincerest sympathies to Viorica Isac on her monumental loss. Her husband was not only a wonderful mathematician but also a outstanding human being who will be greatly missed.

The submitted works of eminent research scientists from the international mathematical community are dedicated to the memory of this leading mathematician and very special colleague and friend, George Isac.

The contributions are organized into two parts. Part I focuses on selected topics in nonlinear analysis, in particular, stability issues for functional equations, and fixed point theorems.

In Chapter 1, Agratini and Andrica present a survey focusing on linear positive operators having the degree of exactness null and fixing the monomial of the second degree.

In their contribution, Amyari and Sadeghi present a Mazur–Ulam type theorem in non-Archimedean strictly convex 2-normed spaces and give some properties of mappings on non-Archimedean strictly 2-convex 2-normed spaces.

The emphasis of Cădariu and Radu is on extending some results of Isac and Rassias on ψ-additive mappings by giving a stability theorem for functions defined on generalized α-normed spaces and taking values in β-normed spaces.

The objective of Constantinescu's contribution is on some investigates of W*-tensor products of W*-algebras.

In his contribution, Dragomir introduces a perturbed version of the median principle and presents its applications for various Riemann–Stieltjes integral and Lebesgue integral inequalities.

M. Eshaghi-Gordji et al. undertake the issues related to the stability of a mixed type additive, quadratic, cubic and quartic functional equation.

A short survey about the Hyers–Ulam stability of ψ-additive mappings is given by Găvruţa and Găvruţa in Chapter 7.

In their contribution, Jun and Kim investigate the generalized Hyers–Ulam stability problem for quadratic functional equations in several variables and obtain an asymptotic behavior of quadratic mappings on restricted domains.

The focus of Jung and Rassias is to apply the fixed point method for proving the Hyers–Ulam–Rassias stability of a logarithmic functional equation.

In their work, Park and Cui use the fixed point method to prove the generalized Hyers–Ulam stability of homomorphisms in C^*-algebras and Lie C^*-algebras and of derivations of C^*-algebras and Lie C^*-algebras for the 3-variable Cauchy functional equation.

In their paper, Park and Rassias use the fixed point method to prove the generalized Hyers–Ulam stability of certain functional equations in real Banach spaces.

The focus of Precup is on presenting new compression and expansion type critical point theorems in a conical shell of a Hilbert space identified with its dual.

The aim of Rus's contribution is to give some Hyers–Ulam–Rassias stability results for Volterra and Fredholm integral equations by using some Gronwall lemmas.

In his contribution, Turinici presents a detailed study of Brezis–Browder's principle. He shows that the version of Brezis–Browder's principle for general separable sets is a logical equivalent of the Zorn–Bourbaki maximality result. In addition, several other interesting connections are established.

The second part of this volume discusses several important aspects of vector optimization and non-smooth optimization, as well as variational problems.

In Chapter 15, Balaj and O'Regan make use of the Kakutani–Fan–Glicksberg fixed point theorem to give an existence theorem for a generalized vector quasi-equilibrium problem.

In their contribution, Cojocaru et al. give a new method of tracking the dynamics of an equilibrium problem using an evolutionary variational inequalities and hybrid dynamical systems approach. They apply their approach to describe the time evolution of a differentiated product market model under incentive policies with a finite life span.

In Chapter 17, Daniele et al. give an overview of recent developments in the theory of generalized projections both in non-pivot Hilbert spaces and strictly convex and smooth Banach spaces. They also study the equivalence between solutions of variational inequalities and critical points of projected dynamical systems.

Eichfelder and Jahn's aim is to present various foundations of a new field of research in optimization unifying semidefinite and copositive programming, called set-semidefinite optimization.

Giannessi and Khan extend the notion of image of a variational inequality by introducing the notion of an envelope for a variational inequality.

In Chapter 20, Goeleven develops a new approach to study a class of nonlinear generalized ordered complementarity problems.

Ha's chapter presents a unified framework for the study of strong efficient solutions, weak efficient solutions, positive proper efficient solutions, Henig global proper efficient solutions, Henig proper efficient solutions, super-efficient solutions, Benson proper efficient solutions, Hartley proper efficient solutions, Hurwicz proper efficient solutions and Borwein proper efficient solutions of a set-valued optimization problem with or without constraints.

The contribution of Isac and Németh presents some mean value theorems for the scalar derivatives which are then used to develop a new method applicable to the study of the existence of nontrivial solutions of complementarity problems.

The chapter by Isac and Tammer presents new necessary conditions for approximate solutions of vector-valued optimization problems in general spaces by introducing an axiomatic approach for a scalarization scheme.

Lukkassen et al. undertake homogenization of sequences of integral functionals with natural growth conditions. Some means are analyzed and used to discuss some fairly new bounds for the homogenized integrand corresponding to integrands which are periodic in the spatial variable. Several applications are given.

In their contribution, Moldovan and Gowda employ duality and complementarity ideas and Z-transformations as well as discuss equivalent ways of describing the existence of common linear/quadratic Lyapunov functions for switched linear systems.

Motreanu's focus is on the necessary conditions of optimality for general mathematical programming problems on a product space. Interesting applications to an optimal control problem governed by an elliptic differential inclusion are given.

In his contribution, Pascali's focus is on studying variational inequalities with S-mappings.

In Chapter 28, a new completely generalized co-complementarity problem for fuzzy mappings is introduced. By using the definitions of p-relaxed accretive and p-strongly accretive mappings, the authors propose an iterative algorithm for computing the approximate solutions, and establish its convergence.

The contribution of Wolkowicz is aimed to illustrate how optimization can be used to derive known and new theoretical results about perturbations of matrices and sensitivity of eigenvalues.

It is our immense pleasure to express our utmost and deepest gratitude to all of the scientists who, by their works, participated in this tribute to honor Professor George Isac. We are grateful to the referees of the enclosed contributions. One of the editors (AAK) expresses his sincere gratitude to Prof. Sophia Maggelakis and Prof. Patricia Clark of RIT and Prof. G. Jailan Zalmai of NMU for their kindness and support.

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