PREFACE

Preface for the Special Issue Optimization, Variational Analysis, and Applications in Honor of Professor Franco Giannessi

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1 Introduction

Professor Franco Giannessi, University of Pisa, is an outstanding mathematician whose contributions to optimization theory and its applications and to the world optimization community are difficult to overstate. For the last 10 years, Professor Giannessi has been an Editors-in-Chief of the Journal of Optimization Theory and Applications (JOTA). Thanks to his leadership, JOTA has become one of the best journals in the area's optimization, variational analysis, and applications. Professor Giannessi announced his retirement from JOTA by the end of the year 2020.

This special issue tributes Franco's great achievements in mathematics, and it is in honor of his 85th birthday. All the contributions are experts in optimization, variational analysis, and applications and have been associated with Professor Giannessi as scientific collaborators, associate editors of JOTA, and in some other ways.

There are total 38 accepted papers in this special issue. The first paper by Michel Théra provides a glimpse of the academic achievements and carrier of Franco, his experience and association with JOTA, and comments from many of his friends and collaborators.

The other 37 papers are arranged in three major themes to which Professor Giannessi has made outstanding contributions. Namely, the first part of the issue includes papers that mainly concern fundamental aspects of convex and variational analysis with applications to variational inequalities and the like. The papers of the second part present results on different aspects of optimization theory and applications, and the third part concerns developments in dynamical systems and optimal control. Needless to say that this arrangement is conditional and some of the papers may naturally belong

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to more than one category. Within each part, the papers are arranged in alphabetical order by the first authors.

2 PART I: Convex and Variational Analysis, Variational Inequalities

The paper by Arutyunov and Zhukovskiy develops new variational principles in Banach spaces and applies these principles to deriving mean value estimates for continuous functions and their specifications. Chadli et al. study the existence of a solution to noncoercive nonlinear variational-hemivariational inequalities in Banach spaces and their applications to a noncoercive unilateral contact problem in continuum mechanics with nonmonotone friction.

The next two papers of this part are mainly devoted to convex analysis. Namely, the paper by Crouzeix addresses the question of whether there exists an increasing and continuous function such that its composition with a convex function is quasiconvex.

The paper by Hantoute and Lopez-Cerda gives a comprehensive tour of the sub differetiability of the supremum functions and their applications. Martinez-Legaz and his co-authors study convergence properties of Bregman-type distance functions associated with convex representations of maximal monotone operators, which play an important role in convex and variational analysis.

Several papers are devoted to (first and second orders) optimality conditions for various classes of variational problems by using techniques of variational analysis and generalized differentiation. The paper by Flores-Bazan and Mastroeni derives in this way new necessary and sufficient optimality conditions for quadratic programming problems with cone constraints. Mohammadi and Mordukhovich develop a novel approach of variational analysis to necessary optimality conditions for constrained variational problems defined in generally incomplete subspaces of absolutely continuous functions. Nadi and Zafarani use second-order point-based optimality conditions in problems of nonlinear programming by using the regular and limiting/Mordukhovich second-order subdifferentials and providing applications to generalized convexity and tilt stability in optimization. The paper by Ngai et al. concerns variational analysis of the class of paraconvex multifunctions by using appropriate tools of generalized differentiation.

3 PART II: Optimization Theory and Its Applications

Many papers deal with various theoretical and numerical aspects of optimization theory and its applications. We cluster them in the second part of this volume. The paper by Aberdam and Beck develops a monotone accelerated coordinate gradient descent-type method for problems consisting of minimizing the sum of a quadratic function and a nonsmooth and non-separable function having a low-complexity proximal mapping. The paper by Ansari and Sharma derives optimality conditions for quasi minimal solutions of set optimization problems by using generalized oriented distance functions and establishing their new properties. Canovas et al. sharpen a lower bound for the

Lipschitz modulus of the optimal value of linear programs under tilt perturbations of the objective function.

The numerical algorithm by Cristofari et al. modifies the augmented Lagrangian method ALGENCAN proposed by Andreani and his collaborators by incorporating certain second-order information into the augmented Lagrangian framework. Another computational algorithm focussed paper written by Cohen et al. proposes a specific proximal linearized alternating direction method of multipliers for the minimization of a broad class of nonsmooth nonconvex objective functions subject to nonlinear functional equality constraints.

The paper by Fargetta et al. develops a stochastic Nash equilibrium problem arising in a practical model of medical supply competition. Gao et al. study a monotone extended second-order cone and its properties and then analyze nonlinear complementarity problems on a cylinder. The paper by Gunther et al. studies various Pareto-type solution concepts for vector optimization problems based on the intrinsic core notion. The authors propose a new Henig-type proper efficiency concept based on generalized relatively solid cones.

Iusem and Lara present a proximal point method for quasiconvex pseudomonotone equilibrium problems, while the paper by Ivanova et al. is devoted to complexity in parametric optimization problems with strictly convex objective functions having Lipschitzian gradients. The paper by Izmailov and Solodov introduces and develops a novel perturbed augmented Lagrangian method framework for constrained optimization problems.

Jahn's paper gives characterizations of optimal solution sets for set optimization problems and provides necessary conditions for set inequalities by employing generalized directional derivatives. Judice and his collaborators introduce an implementation of Dinkelbach's algorithm for computing a global maximum of a fractional linear quadratic program on the simplex that employs an efficient block principal pivoting algorithm at each iteration. Luan et al. consider in their paper a perturbed conic linear program with establishing efficient conditions for the local Lipschitz continuity and differentiability of the optimal value function.

The paper by Mezzadri and Galligani generalizes the projected Jacobi and the projected Gauss–Seidel methods for vertical linear complementarity problems.

In their paper, Qi and his collaborators provide new theoretical and numerical developments in quaternion matrix optimization. The paper by Woolnough et al. applies robust optimization and duality techniques to study support vector machine in order to avoid inaccuracies in clinical onset Huntington disease data. Finally in this part, the paper by Yang and Zu investigates an inexact quasi-subdifferential method with extrapolation for solving a quasiconvex optimization problem with a closed, convex, and bounded constraint set.

4 PART III: Dynamical Systems and Optimal Control

The paper by Attouch et al. deals with a second-order time-continuous dynamical system and derives fast convergence results to solve structured convex minimization problems subject to affine constraints. Bisconti and Mariano describe in their paper the

dynamics of fluids with scattered polymer chains through a multi-field model, which is accounting for weakly non-local inertia and second-neighborhood interactions due to chain entanglements. The paper by Briani et al. studies a shape optimization problem on planar sets with prescribed topology. Bouach et al. study the solvability of the Volterra integro-differential equation with a time-dependent prox-regular constraint. The authors use the method of discrete approximations and provide applications to non-regular electrical circuits.

In their paper, Lasiecka and Triggiani study an optimal feedback control problem over the infinite horizon for the third-order dynamics with boundary controls. The authors introduce a new Riccati operator that satisfies a non-standard algebraic Riccati equation with unbounded coefficients. The paper by C. Liu et al. investigates optimal control problems for nonlinear fractional-order systems with multiple time-varying delays. Another paper on PDE optimal control, by J. Liu et al., studies a coupled elliptic mixed boundary value system with nonlocal effect and mixed boundary conditions, which is governed by coupled variational inequalities. Further, the authors apply their results to some feedback control problem involving a certain least energy condition with respect to control variables.

The paper by Narvaez and Vilches is devoted to the study of degenerate state-dependent sweeping (Moreau) processes with nonregular moving sets. The authors prove the existence of solutions under the Lipschitz continuity of moving sets with respect to the Hausdorff distance. Sarac and Zuazua analyze in their paper side-wise controllability for the one-dimensional wave equation with variable coefficients. Besides various results, the authors formulate a number of open questions. The last paper included in this issue is by Zeng et al. on the solvability of an optimal control problem governed by nonlinear evolutionary quasi-variational-hemivariational inequality involving a set-valued pseudo-monotone map.

It has been a great pleasure and honor for the Guest Editors to organize this special issue dedicated to our friend Franco Giannessi. On behalf of the optimization community, we send Franco best wishes of good health and happiness for many years to come. We appreciate the enormous help and support from the JOTA Editor-in-Chief, Prof. Tamás Terlaky, during all the time handling and editing this issue.

Guest Editors

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