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Preface of the special issue dedicated to the XII Brazilian workshop on continuous optimization

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This special issue is dedicated to the XII Brazilian Workshop on Continuous Optimization, held in the Golden Park International Hotel in Foz do Iguaçu, Paraná, Brazil, between the 23rd and the 27th of July, 2018. The Workshop celebrated simultaneously the seventieth birthday of Professor José Mario Martínez and the sixtieth birthday of Professor Jinyun Yuan. Discussed subjects encompassed theoretical and computational aspects of optimization, as well as applications of both linear and nonlinear programming, including variational inequalities, complementarity problems, nonsmooth optimization, vector optimization, generalized equations, and optimization in manifolds, among other topics.

The Brazilian Workshop on Continuous Optimization is a tradition of the Brazilian Optimization Community that started in 1998. It was held in Campinas (2008), Florianópolis (1998, 2001, 2004, 2014), Foz de Iguaçu (2018), Goiânia (2005), Luís Correia (2012), Mambucaba (2009), Manaus (2016), and Rio de Janeiro (1999, 2002, 2019). In its more than two decades of existence, the Workshop contributed to the consolidation of Continuous Optimization as a widely studied field in Brazil.

The Scientific Committee of the Workshop was composed by Alfredo N. Iusem, Benar F. Svaiter, Claudia Sagastizábal, Ernesto G. Birgin, Jinyun Yuan, José Mario Martínez, Mikhail Solodov, Roberto Andreani, and Sandra A. Santos. The Organizing Committee was composed by Alfredo N. Iusem, Elizabeth W. Karas, Geovani Grapiglia, Mael Sachine, Mikhail Solodov, and Sandra A. Santos. The Workshop was a great success due to the effort of the Organizing Committee with which the Brazilian Continuous Optimization community is in debt. To all of them and to the many students involved in the organization, thank you very much!

The Workshop consisted of plenary lectures, offered by invited speakers, and contributed talks. Plenary lectures were given by Alfredo N. Iusem, Aris Daniilidis, Benar F. Svaiter, Claudia Sagastizábal, Clóvis C. Gonzaga, Ernesto G. Birgin, Hasnaa Zidani, Jinyun Yuan, José Mario Martínez, Mikhail Solodov, Mirjam Dür, Paulo

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J. S. Silva, Peter Richtárik, Philippe Toint, Sandra A. Santos, Ya-Xiang Yuan, and Yu-Hong Dai.

I would like to thank Bill Hager, Editor-in-Chief of Computational Optimization and Applications, for the opportunity to be the guest editor of this special issue. This issue features fourteen papers submitted by participants of the Workshop. The papers accounted below, which were reviewed according to the usual high standards of the journal, cover a wide range of theoretical, practical, and applied topics in optimization.

V. A. Adona, M. N. L. Gonçalvez, and J. G. Melo [1] propose a variant of the proximal generalized alternating direction method of multipliers for solving separable linearly constrained convex optimization problems. In the considered method, it is assumed the first subproblem is approximately solved, while it is assumed the second problem is easy to solve. For the considered variant, iteration-complexity bounds are presented.

Y. T. Almeida, J. X. da Cruz Neto, P. R. Oliveira, and J. C. de Oliveira Souza [2] analyze the convergence of a modified proximal point method for DC functions in Hadamard manifolds. The proposed approach accelerates the classical proximal point method for convex functions.

R. Behling, J. Y. Bello Cruz, and L. R. Santos [3] present a block-wise version of the circumcentered-reflection method for computing projections onto the intersection of affine subspaces. Liner convergence is given and illustrated with numerical examples.

S. Bellavia, N. Krejić, and B. Morini [4] propose a trust-region method for finite-sum minimization. The proposed method employs approximations of the objective function and their derivatives built via random subsampling, with the sample size ruled by an inexact restoration approach. Local and global convergence to first- and second-order points, as well as evaluation complexity results, are given.

L. F. Bueno, G. Haeser, F. Lara, and F. N. Rojas [5] propose an augmented Lagrangian algorithm for solving quasi-equilibrium problems. The Approximate Karush–Kuhn–Tucker (AKKT) optimality condition for nonlinear programming is extended to quasi-equilibrium problems, showing that in general it is not necessarily satisfied at a solution. Global convergence is proved for particular cases in which a solution satisfies the extended condition.

L. F. Bueno, G. Haeser, and L. R. Santos [6] present an augmented Lagrangian method for convex quadratic programming. In their approach, box constraints are penalized while equality constraints are kept as constraints of the subproblems. Well-definiteness and finite convergence of the proposed method are given.

Z. Chen, Y.-H. Dai, and J. Liu [7] introduce a penalty-free method for equality constrained optimization. The method uses trust regions and avoids the Maratos effect with the help of the Lagrangian function. Global and superlinear convergence are established.

M. A. Diniz-Ehrhardt, D. G. Ferreira, and S. A. Santos [8] deal with the pattern search implicit filtering algorithm, a derivative-free method that applies to linearly constrained problems with noisy objective functions. Global convergence of the method is revisited to address locally Lipschitz objective functions corrupted by noise. Numerical experiments address the application of the proposed method to the damped harmonic oscillator parameter identification problem.

J. B. Francisco, D. S. Gonçalves, F. S. V. Bazán, and L. L. T. Paredes [9] propose a non-monotone inexact restoration method for nonlinear programming. While preserving convergence results, numerical experiments show the proposed method outperforms its monotone counterpart.

M. L. N. Gonçalves and L. F. Prudente [10] introduce an extension of the Hager-Zhang conjugate gradient method for vector optimization. A self-adjusting variant that makes use of a sufficiently accurate line search and generates descent directions is proposed.

S. Gratton and Ph. L. Toint [11] introduce a variant of a trust-region algorithm with dynamic accuracy for unconstrained optimization. With an eye on specific applications, the considered method aims to exploit varying levels of preexisting arithmetic precisions for evaluating the objective function and their derivatives.

J. P. Luna, C. Sagastizábal, and M. Solodov [12] develop a variant of Benders decompositions for variational inequality problems. The proposed framework includes a rather broad class of multi-valued maximally monotone mappings, and single-valued nonmonotone mappings. Subproblem solvability is guaranteed and approximate solution of the subproblems is allowed.

D. Orban and A. S. Siqueira [13] propose a regularization method for nonlinear least-squares problems with equality constraints. The regularization term involving primal and dual variables can be seen as a reformulation of an augmented Lagrangian. A simple trick avoids dealing with matrices of the form $A(x)^T A(x)$ and so the method is adequate for large-scale and ill-conditioned problems. Global and superlinear convergence are established.

M. R. Sicre [14] tackles a variant of a hybrid proximal extragradient projective method for solving monotone inclusion problems. For the considered variant, point-wise and ergodic iteration complexity results are established. Global convergence and iteration complexity results for a family of projective splitting methods that apply to the same problem are also presented.

Professors Martínez and Yuan are undoubtedly among the most outstanding representatives of the Brazilian community of continuous optimization. Throughout their ongoing careers they have contributed and continue to contribute significantly to the development of Continuous Optimization in particular and to Applied and Industrial Mathematics in general. Both were awarded with the National Order of Scientific Merit in the Comendador Class, which is awarded to Brazilian and foreign personalities who distinguished themselves for their relevant contributions to Science, Technology, and Innovation. They also are full members of the Brazilian Academy of Science. In 2020, Professor Martínez became Emeritus Professor at the University of Campinas.

Professor Martínez's contributions to Optimization include, but are not limited to, several theoretical and practical aspects of Quasi-Newton methods, Inexact Restoration methods, Spectral Projected Gradients, augmented Lagrangians, Constraint Qualifications, Optimality Conditions and applications. Professor Yuan's contributions to Numerical Analysis are related to least squares problems, generalized least squares problems, preconditioned conjugate gradient method, and method of moments.

The Workshop, which honored the careers of Professor Martínez and Professor Yuan, took place in an atmosphere of friendship and collaboration. It was an exciting opportunity to share memorable moments and, at the same time, exchange new ideas and developments. In many senses, I hope we would have the opportunity to enjoy more workshops full of people like this one many times in the future. For the curious readers, pictures of the event can be found at http://www.ime.usp.br/~egbirgin/Pictures/BrazOpt2018/. For the even more curious readers, pictures of the workshop that occurred a decade before, are available at http://www.ime.usp.br/~egbirgin/Pictures/BrazOpt2008/.

PHOTO: ANA FRIEDLANDER

Professors Jinyun Yuan and José Mario Martínez (Foz do Iguaçu, 2018).

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