ISMP2018 BORDEAUX

23rd International Symposium on Mathematical Programming

July 1 - 6

The World Congress of Mathematical Optimization

Held triennially on behalf of the Mathematical Optimization Society

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https://ismp2018.sciencesconf.org

Welcome Address

It is a great pleasure to welcome all of you to Bordeaux for this triennial international congress of mathematical optimization. ISMP is the symposium of the Mathematical Optimization Society (MOS). It gathers scientists from all over the world as well as industrial practitioners of mathematical optimization. Attendees present their most recent developments and results and discuss new challenges from theory and practice.

This 23rd edition of the symposium is organized by the mathematical optimization group of the University of Bordeaux with the contributions of other mathematical optimization researchers of the French community. The core of the local organizers is structured around the Inria project team Realopt which is a joint venture between the University, Inria and two CNRS research labs of the University: the Mathematics Institute (IMB - team OPTIMAL - in Mathematical Optimization, Stochastic Models and Statistics) and the Computer Science Lab (LaBRI - team Combinatorics and Algorithms). The practical organization is taken care of by the congress office of the University of Bordeaux, the communication office of Inria-Bordeaux, and the ADERA congress service, with the support of the University of Bordeaux Initiative of Excellence (Idex) and the Regional authorities of Nouvelle-Aquitaine.

This edition is the outcome of a collaborative venture involving the participation of many members of the international community. The program committee has done a great job in reaching out to invited speakers. It was headed by Michael Jünger who has also been so active in driving the special issue of Math Programming B. Through the scientific committee, we have put many people to work for co-opting invited sessions and performing the immense editorial task of gathering talks into sessions. The support services of our institutions and the local team have been largely put to contribution on all aspects of the organization. We want to highlight the tremendous job done by our engineers, Philippe Depouilly and Laurent Facq, to setup the editorial platform, and by our colleagues to optimize the schedule, in particular Pierre Pesneau who implemented the scheduler, while our students have contributed to deliver automation tools. Last but not least, we are deeply grateful to the cohort of volunteer students and staff who are key elements of the logistical organization during the ISMP week.

The happening is yours. Your scientific contributions are feeding the interesting program which we shall all benefit from. So thank you for your participation and let us enjoy this congress, learn from it, and build the network of your future collaborations.

François Vanderbeck
University of Bordeaux
& Inria Bordeaux

Speaker: Francesco Rinaldi, University of Padova, IT, talk 825
Co-Authors: *Giampaolo Liuzzi*, *Stefano Lucidi*, *Luis Nunes Vicente*,
In this talk, we first describe a model-based algorithmic framework for the unconstrained minimization of a nonsmooth black-box function. Then, we carry out a theoretical analysis of the approach. Finally, we report some preliminary numerical results showing the effectiveness of the method.

3 - A flexible, robust and efficient derivative-free solver for least squares
Speaker: Lindon Roberts, University of Oxford, GB, talk 864
Co-Authors: *Coralia Cartis*, *Benjamin Marteau*, *Jan Fiala*,
We present DFO-LS, a software package for derivative-free optimization (DFO) for nonlinear least-squares problems, that has simplified models, flexible initialization and improved robustness to noise. Inspired by the Gauss-Newton method, DFO-LS constructs simplified linear regression models for the residuals. DFO-LS also has improved flexibility for expensive problems, whereby it can begin making progress from as few as two objective evaluations. Numerical results show DFO-LS can gain reasonable progress on some medium-scale problems with fewer objective evaluations than is needed for one gradient evaluation. For noisy problems, DFO-LS allows a wide variety of sample averaging methodologies, the construction of highly overdetermined regression models, and restart strategies. Our extensive numerical experimentation shows that restarting the solver when stagnation is detected is a cheap and effective mechanism for achieving robustness, with superior performance. We also discuss our package PyBOBYQA, a Python implementation of BOBYQA (Powell, 2009) which implements some of these features for general objective problems.

4 - MultiGLODS: Clever Multistart in Multiobjective Directional Direct Search
Speaker: Ana Custodio, Universidade Nova de Lisboa, PT, talk 1480
Co-Authors: *Jose Madeira*,
The optimization of multimodal functions is a challenging task, in particular when derivatives are not available for use. Recently, in a directional direct search framework, a clever multistart strategy was proposed for global derivative-free optimization of single objective functions. The goal of the current work is to generalize this approach to the computation of global Pareto fronts for multiobjective multimodal derivative-free optimization problems. The proposed algorithm alternates between initializing new searches, using a multistart strategy, and exploring promising subregions, resorting to directional direct search. Components of the objective function are not aggregated and new points are accepted using the concept of Pareto dominance. The initialized searches are not all conducted until the end, merging when start to be close to each other. We will describe the algorithmic structure considered, present the main associated theoretical results, and report related numerical experience that evidences the quality of the final solutions generated by the new algorithm and its capability in identifying approximations to global and local Pareto fronts of a given problem.

Optimality conditions in NLP and conic problems

Continuous Optimization
NLP - We 8:30am-10:30am, Format: 4x30 min
Room: Salle 05 Building: Q, 1st floor, Zone: 11

Invited Session 43
Organizer: Roberto Andreani, UNICAMP, BR

1 - A SEQUENTIAL OPTIMALITY CONDITION RELATED TO THE QUASINORMALITY CQ
Speaker: Roberto Andreani, UNICAMP, BR, talk 522
Co-Authors: *Nadia Fazio*, *Maria Schuverdt*, *Leonardo Secchin*,
In the present paper, we prove that the augmented Lagrangian method converges to KKT points under the quasinormality constraint qualification, which is associated with the external penalty theory. For this purpose, a new sequential optimality condition for smooth constrained optimization, called PAKKT, is defined. The new condition takes into account the sign of the dual sequence, constituting an adequate sequential counterpart to the (enhanced) Fritz-John necessary optimality conditions proposed by Hestenes, and later extensively treated by Bertsekas. We also provided the appropriate strict constraint qualification associated with the PAKKT sequential opti- mality condition and we prove that it is strictly weaker than both quasinormality and cone continuity property. This generalizes all previous theoretical convergence results for the augmented Lagrangian method in the literature.

2 - An extension of Yuan's Lemma and its applications in optimization
Speaker: Gabriel Haeser, University of Sao Paulo, BR, talk 205
We prove an extension of Yuan's lemma to more than two matrices, as long as the set of matrices has rank at most 2. This is used to generalize the main result of Baccari and Trad (SIAM J Optim 15(2):394-408, 2005), where the classical necessary second-order optimality condition is proved, under the assumption that the set of Lagrange multipliers is a bounded line segment. We prove the result under the more general assumption that the Hessian of the Lagrangian, evaluated at the vertices of the Lagrange multiplier set, is a matrix set with at most rank 2. We apply the results to prove the classical second-order optimality condition to problems with quadratic constraints and without constant rank of the Jacobian matrix, which settles a new particular case of the conjecture of Andreani, Martínez and Schuverdt (Optim 56:529-542, 2007). Some further recent results about this conjecture will also be discussed.

3 - Optimality Conditions for Generalized Nash Equilibrium Problems
Speaker: Luis Felipe Bueno, UNIFESP, BR, talk 194
Co-Authors: *Gabriel Haeser*, *Frank Rojas*,
Generalized Nash Equilibrium Problems (GNEPs) are a generalization of the classic Nash Equilibrium Problems (NEPs), where each player's strategy set depends on the choices of the other players. In this work we study constraint qualifications and optimality conditions tailored for GNEPs and we discuss their relations and implications for global convergence of algorithms. Surprisingly, diferently from the case of nonlinear programming, we show that, in general, the KKT residual can not be made arbitrarily small near a solution of a GNEP. We then discuss some important practical consequences of this