Editorial

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The *5th EUROPT Workshop on Advances in Continuous Optimization* (wwwhome.math.utwente.nl/∼stillgj/COPT06) took place in Reykjavik, Iceland, on June 30 and July 1, 2006, just before the *EURO XXI* conference (www.euro2006.org). It continued the line of the successful EUROPT conferences held 2000 in Budapest, 2001 in Rotterdam, 2003 in Istanbul, and 2004 in Rhodes. It brought together researchers from various areas of continuous optimization and from related fields of discrete optimization, operations research, economy and technology. With six Invited Lectures, 33 Contributed Lectures and about 80 participants from 23 countries, it proved to be a perfect forum for the exchange of recent scientific developments and for the discussion of new trends.

This special issue is initiated by EUROPT, the EURO Working Group on Continuous Optimization (www.iam.metu.edu.tr/EUROPT), in close correspondence with EURO. It aims at demonstrating important recent contributions to the wide research field of modern continuous optimization, at pointing out its challenges and at inviting to future research and collaboration among the countries of EURO and beyond. In particular, it contains papers presented during the EUROPT Workshop and in the continuous optimization streams of EURO XXI.

Optimization problems over relatively simple sets such as a simplex, hypercube or sphere arise naturally from diverse applications. In his article

"The Complexity of Optimizing over a Simplex, Hypercube or Sphere: a Short Survey", Etienne de Klerk considers the computational complexity of optimizing various classes of continuous functions over such elementary geometrical bodies. Models of computation and complexity are introduced, and known approximation results as well as negative "inapproximability" results from the recent literature are reviewed and approximation results given. The author hopes that this new research area will attract interested researchers.

Ivo Nowak's and Stefan Vigerske's paper *"LaGO - a (Heuristic) Branch and Cut Algorithm for Nonconvex MINLPs"* offers a branch and cut algorithm of the software package LaGO to solve nonconvex mixed-integer nonlinear programs. A linear outer problem approximation is constructed by convex relaxation. Since an algebraic problem representation is not required, reformulation techniques for the construction of the convex relaxation cannot be applied, and the authors are restricted to sampling techniques. Mixed-integer-rounding cuts and box reduction techniques are applied, and numerical examples and comparisons demonstrate efficiency.

In their paper *"A Computational Comparison of some Branch and Bound Methods for Indefinite Quadratic Programs"*, Riccardo Cambini and Claudio Sodini discuss different branch and bound methods for solving indefinite quadratic programs. Indeed, they decompose the quadratic objective function in a d.c. form, and the relaxations are obtained by linearizing the concave part of the decomposition. Various decomposition schemes are considered and studied. Different branch and bound solution methods have been implemented and compared by a computational test. Calculus, linear algebra, subroutines and results are well presented and documented.

Laura Carosi and Laura Martein in their contribution *"A Sequential Method for a Class of Pseudoconcave Fractional Problems"* aim at the maximization of a pseudoconcave function which is the sum of a linear and a linear fractional function subject to linear constraints. This is called a generalized fractional problem. Firstly, they establish theoretical properties by characterizing in a simple way the pseudoconcavity of the considered function and, successively, showing existence results about optimal solutions. Then, a sequential method based on a simplex-like procedure is proposed. Analysis and numerics are carefully given and open problems stated.

János D. Pintér in his contribution *"Model Development and Optimization in Interactive Computing Environments"* presents an interactive approach which is able to accelerate and enhance learning and research processes. With systems such as Maple, Mathematica and MATLAB, teachers, students, researchers and practitioners can develop applications in an interactive format, and a service is given to the development of text-books, lectures and assignments. With small instructive codes and beautiful illustrations, the author discusses a (global and local) optimization software and a related e-book supporting interactive model development and optimization in Maple.

In his paper *"Cascading - An Adjusted Exchange Method for Robust*

Conic Programming", Ralf Werner studies the robust counterpart for conic convex programs under data uncertainty. Compared to the original problem, the numerical complexity of the solution increases. On the approximation algorithm called "cascading" introduced for that reason by Kočvara, Nemirovski and Zowe in the special case of robust material optimization, the author shows that it can be interpreted as an adjustment of exchange methods to semi-infinite conic programming. He also demonstrates that this adjustment can be motivated by the reformulated robust conic problem.

By Laura Scrimali's paper *"The Financial Equilibrium Problem with Implicit Budget Constraints"* a contribution from continuous optimization, stochastic and set-valued calculus is given to the special issue. It presents the time-dependent, multi-agent and multi-activity equilibrium problem with implicitly defined budget constraints. Under the assumption that the total wealth is elastic with respect to the optimal investment, equilibrium conditions are derived without any recourse to Lagrangian theory, before the problem is considered as an infinite dimensional quasi-variational inequality for which an existence result is given.

The class of semidefinite and semi-infinite programming problems (SDSIP) includes semidefinite programs (SDP) and linear semi-infinite programs (LSIP) as special cases. In the article *"Uniform LP Duality for Semidefinite and Semi-infinite Programming",* Qinghong Zhang also represents a uniform LP duality between (SDSIP) and its dual (DSDSIP). The author shows that (SDSIP) is an ordinary (LSIP) one and, therefore, all the existing results regarding duality and uniform LP duality for (LSIP) can be applied. Herewith, the main duality results of a paper by S.J. Li, X.Q. Yang and K.L. Teo can be easily obtained.

In bi-parametric Linear Optimization (LO), perturbation occurs in both the right-hand-side and the objective function data with different parameters. In their paper *"Bi-Parametric Optimal Partition Invariancy Sensitivity Analysis in Linear Optimization",* Alireza Ghaffari-Hadigheh, Habib Ghaffari-Hadigheh and Tamás Terlaky present computable algorithms for identifying the regions where the optimal partitions are invariant. It is proved that the invariancy regions are separated by vertical and horizontal lines, and thus generate a mesh-like area. Algorithms are given for identifying the invariancy regions in polynomial time.

We are convinced that all papers presented in this special issue not only satisfy the high standards of CEJOR, but also constitute important contributions to many different areas in Continuous Optimization. For their valuable help in refereeing the articles submitted to this special issue, we are deeply indebted to 38 referees.

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(Guest Editors)