

Guest editorial

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This issue of *Computational Optimization and Applications* collects a selection of referred papers that have been presented at the Workshop on *Nonlinear Optimization: a bridge from theory to applications* held in Erice, Italy, on June 10–17, 2013 at the “E. Majorana” Centre for Scientific Culture within the “G. Stampacchia” International School of Mathematics. The Workshop was the seventh in a series of workshops on Nonlinear Optimization held in Erice from 1995 every three years.

In the tradition of these meetings, the purpose of the workshop was to review and discuss recent advances and promising research trends in Nonlinear Optimization and to provide a forum for fruitful interactions in strictly related fields of research, with a particular focus on applications.

The meeting was attended by 56 people from 22 different countries, with 13 invited lectures and 37 contributed talks. Besides the lectures, several formal and informal discussions took place. The result was a wide and deep review of the present research achievements in Nonlinear Optimization and related topics. We wish to express our appreciation to all the participants for their active contribution to the success of the workshop.

This special issue includes nine papers selected after a peer revision. They represent a significative review of the recent developments in Nonlinear Optimization and consider theoretical, numerical and application aspects. In the sequel a brief presentation of the papers included in this special issue is given.

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The paper by Astorino, Gaudioso and Seeger deals with outliers detection in high dimensional dataset with a new perspective compared to the traditional setting. In particular, the concept of central axis for a finite dataset is given, along with a numerical procedure to calculate it. Moreover, how to detect numerically the most peripheral points of the given dataset is explained.

In the paper by Bellavia, De Simone, di Serafino and Morini the problem of preconditioning sequences of regularized KKT systems is addressed. Such systems arise in interior point methods for convex quadratic programming, and constraint preconditioners are very effective and widely used in this context. In particular, a procedure for updating constraint preconditioners for sequences of such systems having a fixed sparsity pattern is proposed and numerically tested.

Derivative-free global optimization problems where both bound and general constraints are present are considered in the paper by Di Pillo, Liuzzi, Lucidi, Picciali and Rinaldi. The combined use of a new DIRECT—type strategy which takes into account the two-fold nature of the constrained optimization, and of a derivative—free local minimization of a nonsmooth exact penalty function is proposed. The experimentation on hard test problems showed the viability of this approach.

A hybrid method for generalized Nash equilibrium problems is proposed in the paper by Dreves. In particular, an improved error bound is used to weaken the theoretical convergence assumptions of a hybrid method which uses a smooth reformulation.

In the paper by Fasano and Roma a new class of preconditioners for large positive definite linear systems arising in nonlinear optimization is proposed. Some spectral properties are reported along with the results of an extensive numerical experience, both in solving relevant linear systems and in embedding the proposed preconditioners within truncated Newton methods.

The paper by Liuzzi, Lucidi and Piccialli deals with the definition of new deterministic algorithms for the solution of hard box—constrained global optimization problems when the derivatives of the objective function are unavailable. In particular, a DIRECT—type algorithm is considered and enriched by the efficient use of derivative—free local searches combined with nonlinear transformation of the feasible domains and of the objective function. The results of an extensive numerical testing are reported.

A typical industrial uniform coverage problem is considered in the paper by Nowak and Küfer. They discuss a simplified model of the problem and show how a modified Remez algorithm can be applied to find the optimal solution for this application.

In the paper by Robinson, an affine variational inequality posed over a polyhedral convex set in n -dimension Euclidean space is considered. It is shown that, under a regularity condition, the problem can be reduced to the solution of an affine variational inequality in a space of smaller dimension.

The paper by Schiro, Hobbs and Pang deals with Nash equilibrium models of perfectly competitive capacity expansion involving risk—averse participants in the presence of state uncertainty and pricing mechanisms. Existence result is established for more realistic multi-stage market models that account for risk aversion and player-specific beliefs about the future.

We are indebted to many anonymous referees who took care to review all the papers submitted for publication in this special issues.

We are grateful to Professor Franco Giannessi, Director of the International School of Mathematics “G. Stampacchia”, for promoting the workshop and to the “E. Majorana” Centre in Erice, which offered its facilities and rewarding environment. We are also grateful to Sapienza University of Rome, to University of Calabria, to University Ca’ Foscari of Venice and to Istituto Nazionale di Alta Matematica “F. Severi” for their financial support.

Finally, we especially thank William Hager, editor in chief of *Computational Optimization and Applications* for the publication of this special issue.

We wish to express our sorrow for the loss of Vladimir Demyanov and Michael J.D. Powell who have been repeatedly invited lecturers and proactive participants to this series of workshops and who passed away shortly after the closing of the last one.

As already stated, the Erice 2013 Workshop was the seventh in a series of workshops on Nonlinear Optimization that started in 1995. Today, after 21 years, Nonlinear Optimization has had broad impact in the optimization community, and we are proud of the contributions to the field by the many distinguished scholars who attended and participated in the workshops. Thus, with this special issue devoted to the Erice 2013 Workshop, we close this series of Erice workshops on Nonlinear Optimization.