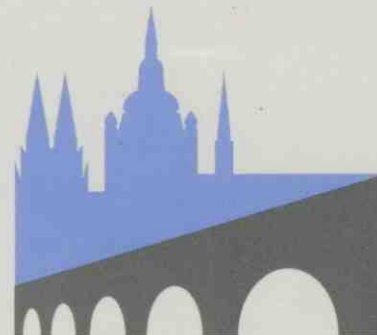


Prague, July 8 - 11, 2007

# Book of Abstracts



EURO XXII  
PRAGUE

22<sup>nd</sup> EUROPEAN CONFERENCE ON OPERATIONAL RESEARCH

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### The EURO XXII Conference is hosted by

ČSOV - The Czech Society of Operational Research,  
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Monday, 13:00-14:30

Room SB 239

**Problems with Equilibrium Constraints**

Stream: Variational Inequalities and Bi-Level Problems

Invited session

Chair: *Stephan Dempe*, Mathematics and Computer Sciences, Technische Universitaet Freiberg, 09596, Freiberg, Germany, dempe@math.tu-freiberg.de

**1 - Several approaches to the semivectorial bilevel optimization problem**

*Henri Bonnel*, ERIM, University of New Caledonia, B.p. R4, F98851, Noumea, New Caledonia, bonnel@univ-nc.nc

The paper deals with the optimistic formulation of bilevel optimization problem considering the lower level given by a vector (multiobjective) optimization problem. An exterior penalty method is proposed to solve the general nonlinear case in Banach spaces. When the lower level is a convex vector minimization problem, general optimality conditions are presented. Applications to the particular case when the lower level is a linear multiobjective optimization problem are considered.

**2 - Multiobjective Problems with Equilibrium Constraints with applications to oligopolistic markets**

*Michal Cervinka*, MTR, UTIA AV CR., Pod Vodarenskou vezi 4, 18208, Praha, Czech Republic, cervinka@utia.cas.cz, *Boris Mordukhovich*, *Jiri Outrata*

We consider a rather new class of hierarchical games called Equilibrium Problems with Equilibrium Constraints (EPECs). Among others, via EPECs one can model a hierarchical oligopolistic market with more than one leader. We investigate the case when the leaders cooperate, and we assume that the behavior of the followers is described by a mixed complementarity problem. We derive new necessary optimality conditions and propose a numerical method to solve the class of EPECs under consideration. The results obtained are applied to an oligopolistic market model.

**3 - Mathematical Programs with Vanishing Constraints**

*Christian Kanzow*, University of Wuerzburg, Institute of Mathematics, Am Hubland, 97074, Wuerzburg, kanzow@mathematik.uni-wuerzburg.de, *Wolfgang Achtziger*

We consider a class of optimization problems that we call a mathematical program with vanishing constraints (MPVCs). These problems arise, e.g., in the optimal topology design of mechanical structures. MPVCs are related to MPECs, but have additional properties that should be exploited directly. We discuss several theoretical properties of MPVCs including some optimality conditions. These optimality conditions make use of specific constraint qualifications since most standard CQs are violated for MPVCs. We also present possible numerical approaches and preliminary numerical results.

**4 - A view on nonlinear programming developments for solving MPCCs**

*Daniel Ralph*, Judge Business School, Cambridge University, Trumpington St, CB2 1AG, Cambridge, United Kingdom, d.ralph@jbs.cam.ac.uk

The last decade has seen great advances in computational methods for finding local solutions of mathematical programs with equilibrium constraints, MPECs. This talk will focus on nonlinear programming based methods for solving mathematical programs with complementarity constraints, MPCCs, an area which has blossomed in the last five years. We trace the development of some NLP ideas to MPCCs - from smoothing to direct application of NLP methods - and indicate links between methods and convergence results.

**MC-07**

Monday, 13:00-14:30

Room SB 240

**Modern Numerical Methods in Semi-Infinite Optimisation**

Stream: Semi-Infinite Optimisation

Invited session

Chair: *Andre Tits*, University of Maryland, 20742, College Park, MD, United States, andre@umd.edu

**1 - Multibody design centering via general semi-infinite optimization**

*Anton Winterfeld*, Optimization, Fraunhofer ITWM, Fraunhofer-Platz 1, 67663, Kaiserslautern, Germany, winterfeld@itwm.fraunhofer.de

Design centering problems deal with the optimal embedding of a parameterized body (the design) into a second body (the container). If several designs and several containers are to be considered simultaneously, one speaks about multibody design centering problems (MBDC). The designs are often required to be non-overlapping. We show that, under some convexity assumptions, a MBDC with non-overlapping conditions can be formulated as a general semi-infinite program. A modified version of Stein's algorithm is used to solve some practical problems, and the results are presented.

**2 - The semismooth approach for GSIP**

*Aysun Tezel*, Faculty of Economics, University of Karlsruhe, 76128, Karlsruhe, Germany, atezel@metu.edu.tr, *Oliver Stein*

We study convergence of a semismooth Newton method for generalized semi-infinite programming problems with convex lower level problems. In this approach, the upper and lower level Karush-Kuhn-Tucker conditions are reformulated as a semismooth system of equations. We state regularity conditions under which the method works. In the case of violated strict complementarity in the lower level the regularity condition becomes complicated. Some numerical examples illustrate the performance of the method.

**3 - Numerical experiments with a reduction method in semi-infinite programming**

*Edite Fernandes*, Produção e Sistemas, Universidade do Minho, Escola de Engenharia, Campus de Gualtar, 4710-057, Braga, Portugal, emgpf@dps.uminho.pt, *Ana Pereira*

To solve nonlinear semi-infinite programming problems we use a global reduction method. The method relies on a simulated annealing algorithm combined with a function stretching technique, as the multi-local procedure, and on a penalty technique as a finite optimization procedure. A second-order correction is also included to prevent the Maratos effect from occurring. To promote global convergence, an Armijo line search with an exponential merit function is incorporated in the algorithm. Preliminary numerical results are also presented.

**4 - Convergence of a Constraint-Reduced Predictor-Corrector Algorithm for Semi-Infinite Programming**

*Luke Winternitz*, Electrician and Computer Engineering and Institute for Systems Research, University of Maryland, A.V. Williams Bldg, 20742, College Park, MD, United States, lukewinternitz@gmail.com, *Stacey Nicholls*, *Andre Tits*, *Dianne O'Leary*

Linear programs with many more (dual) inequality constraints than variables are considered, in particular finely discretized semi-infinite linear programs. Global and local quadratic convergence are proved under non-degeneracy assumptions for a "constraint-reduced" version of Mehrotra's Predictor-Corrector algorithm (rMPC). At each iteration of this method, an approximate "normal equation" is solved, based only a small subset of the constraints, resulting in significant time savings per iteration. Numerical results on a variety of test problems show promise.