

■ FC-05

Friday, 10:15 - 12:15
23.3.9

Convex Analysis and Applications 1

Contributed session

Chair: *Edite M.G.P. Fernandes*, Production and Systems, University of Minho, School of Engineering, Campus de Gualtar, 4710-057, Braga, Portugal, emgpf@dps.uminho.pt

1 - Lipschitz modulus of the feasible set mapping for linear and convex semi-infinite systems under different perturbation settings

Juan Parra, Operations Research Center, Miguel Hernández University, Avda. del Ferrocarril s/n, (Edif. Torretamarit), 03202, Elche, Alicante, Spain, parra@umh.es, *Maria Josefa Cánovas*, *Francisco J. Gómez-Senent*

Our most particular setting is that of linear inequalities whose coefficients continuously depend on the index (ranging in a compact Hausdorff space), and right-hand-side perturbations. Our most general setting is that of convex inequalities (and possibly finitely many linear equations) with no particular functional dependence on the index (ranging on an arbitrary set), and where each constraint may be perturbed by means of an affine function. In all cases we provide (at least conceptually) computable expressions for the Lipschitz modulus relying only on the nominal system's data.

2 - A semi-infinite reduction type algorithm based on an exact penalty function

Alzira Mota, Mathematic, ISEP, Oporto, Portugal, atm@isep.ipp.pt, *A. Ismael F. Vaz*

During the last decades several algorithms were proposed for semi-infinite programming (SIP), but there is not much publicly available software. In this talk we propose a reduction type algorithm based on an exact penalty function for SIP. The proposed algorithm has been implemented in MATLAB and numerical results are shown with a set of test problems from the SIPAMPL database. The algorithm implementation is to be publicly available.

3 - Solving semi-infinite programming problems using filter method

Ana I. Pereira, Polytechnic Institute of Braganca, Campus de Sta Apolonia, Apartado 134, 5301-857, Braganca, Portugal, apereira@ipb.pt, *M. Fernanda P. Costa*, *Edite M.G.P. Fernandes*

Semi-infinite programming problems can be efficiently solved by reduction type methods. Here, we present a new global reduction method for Semi-infinite programming, where the multi-local optimization is carried out with a stretched simulated annealing algorithm, the reduced problem is approximately solved by a primal-dual interior point method combined with a three-dimensional filter line search strategy, and the global convergence is promoted through a two-dimensional filter line search. Numerical experiments with a set of well-known problems are shown.

4 - Regularity modulus of intersection mappings: Application to linear semi-infinite systems of equations and inequalities

Francisco J. Gómez-Senent, Operations Research Center, Miguel Hernández University, Orihuela, Alicante, Spain, paco.gomez@umh.es, *Maria Josefa Cánovas*, *Juan Parra*

The first part of this talk is devoted to relate the (metric) regularity modulus of the intersection mapping associated with a given finite family of set-valued mappings to the maximum of moduli of this family. We specifically refer to the so-called linear regularity and equiregularity properties. In the second part we determine the Lipschitz modulus of the feasible set mapping associated with a parameterized linear semi-infinite system containing a finite amount of equations, via the strategy of splitting them and applying results from linear inequality systems.

■ FC-06

Friday, 10:15 - 12:15
23.3.10

Conic and Semidefinite Programming 1

Contributed session

Chair: *Miguel Anjos*, Management Sciences, University of Waterloo, 200 University Avenue West, N2L 3G1, Waterloo, Ontario, Canada, anjos@stanfordalumni.org

1 - An Improved Characterisation of the Interior of the Completely Positive Cone

Peter Dickinson, Systems, Control and Applied Analysis, Johann Bernoulli Institute for Mathematics and Computer Science, University of Groningen, Bernoulliborg, P.O. Box 407, 9700 AK, Groningen, Groningen, Netherlands, P.J.C.Dickinson@rug.nl

The completely positive cone is the dual of the copositive cone and these cones are useful in binary and quadratic optimisation. Therefore it is important to study the properties of these cones. In this talk we present an improved characterisation of the interior of the completely positive cone in the form of a relaxation of the constraints from a previous characterisation. This is done by introducing the concept of the set of zeros in the nonnegative orthant for a quadratic form and looking at the properties of this set for copositive matrices.

2 - Approximating convex functions with linear, quadratic or semidefinite extended formulations

François Glineur, CORE, Université catholique de Louvain (UCLouvain), Voie du Roman Pays, 34, B-1348, Louvain-la-Neuve, Belgium, Francois.Glineur@uclouvain.be

An extended formulation expresses a convex set defined by large number of inequalities as a projection of a simpler (i.e. with less inequalities) but higher-dimensional set. This enables more efficient handling of the original set in optimization models.

We investigate the application of this technique to arbitrarily accurate approximations of several classes of convex functions (via their epigraphs), such as Euclidean norm, trigonometric functions, (matrix) logarithm, exponential and entropy, for which we present linear, quadratic or semidefinite extended formulations.

3 - Projection of a matrix onto the copositive cone

Julia Sponsel, Faculty of Mathematics and Natural Sciences, University of Groningen, Johann Bernoulli Institute for Mathematics and Computer Science, P.O. Box 407, 9700 AK, Groningen, Netherlands, J.K.Sponsel@rug.nl

In this talk we present an algorithm to approximate the projection of a matrix A onto the copositive cone C with arbitrary precision. The matrix is projected onto a sequence of polyhedral inner and outer approximations of C . We show that if the approximations converge to the copositive cone, the sequences of projections onto the inner resp. outer approximations converge to the projection of A onto C . Furthermore we go into the aspect how to construct the sequences of inner and outer approximations of C in order to improve the performance of the algorithm.