Workshop on Nonlinear Optimization

5 -6 June 2015

The aim of the Workshop is to bring optimization experts in vector optimization and nonlinear optimization together to exchange their recent research findings and outcomes.

Program

5 June

09:30 – 10:20 Chen Guangya
Title: On Game Problems with Vector-Valued Payoffs
10:20 - 10:45 Carisa Yu
Title: Robust Portfolio Optimization Technique for the Mean-CVaR Problem

11:00 – 11:40 Li Chong
Title: Approximate Solutions for Abstract Inequality Systems
11:40 – 12:20 Li Shengjie
Title: Unified Duality Theory for Constrained Extremum Problems

14:00 - 14:40 Li Donghui
Title: TBA
14:40 - 15:05 Chen Zhe
Title: The Collusion and Corruption in Public Procurement Auctions

15:20 - 15:45 Zhang Kai
Title: Application of the Generalized Augmented Lagrangian Method to Complementarity Problems Arising from Fiance
15:45 – 16:10 Yaohua Hu
Title: Linearized Proximal Algorithms for Convex Composite Optimization with Applications

6 June

Discussions

Venue: Y302

On Game Problems with Vector-Valued Payoffs

Guangya Chen
Chinese Academy of Sciences
Email: chengy@amss.ac.cn

We introduce Shaplay's model on game problems with vector payoffs and Aumann's extension. We introduce also Aumann's works on utility functions and applications in research of this kind of game problems.

Robust Portfolio Optimization Technique for the Mean-CVaR Problem

Carisa K. W. Yu
Department of Mathematics and Statistics
Hang Seng Management College
Email: carisayu@hsmc.edu.hk

In the traditional portfolio optimization problem, variance is adopted as the measure of risk. More recently, Conditional Value-at-Risk (CVaR), defined as conditional expected value of the loss given that the loss exceed Value-at-Risk (VaR), has become a more efficient risk measure because it possesses some attractive properties such as sub-additivity, convexity and coherency. This paper deals with a portfolio optimization problem in the framework of return-risk trade-off analysis in which a mean-CVaR problem is formulated. Regarding the mean-CVaR problem in the portfolio management framework, CVaR is minimized subject to the complex cardinality constraints on the portfolio structure to limit the number of financial assets in the portfolio. An important feature of this paper is to apply the techniques of robust optimization to deal with uncertainty. Different approaches for the generation of input data are illustrated by empirical examples in the Hong Kong stock market.

Approximate Solutions for Abstract Inequality Systems

Chong Li
Department of Mathematics
Zhejiang University
Email: cli@zju.edu.cn

We consider the conic inequality systems of the type: $F(x) \geq_K 0$ with approximate solution x_0 associated to a parameter τ , where F is a twice Fréchet differentiable function between Hilbert spaces X and Y, and $\geq_K$ is the partial order in Y defined by a nonempty convex (not necessarily closed) cone $K \subseteq Y$. We prove that, under the suitable conditions, the system $F(x) \geq_K 0$ is solvable and the ratio of the distance from x_0 to the solution set S over the distance from $F(x_0)$ to the cone K has an upper bound given explicitly in terms of τ and x_0. We show that the upper bound is sharp. Application to analytic function inequality/equality systems on Euclidean spaces are given, and the corresponding results of Dedieu (SIAM J. Optim., 11(2000), pp. 411-425) are extended and significantly improved.

Unified Duality Theory for Constrained Extremum Problems

Shengjie Li
Chongqing University
Email: lisj@cqu.edu.cn

By virtue of the image space analysis approach, a unified duality scheme for a constrained extremum problem based on the class of regular weak separation functions in the image space is proposed. Some equivalent characterizations to the zero duality property are obtained under an appropriate assumption. Moreover, some necessary and sufficient conditions for the zero duality property are also established in the form of the perturbation function. Simultaneously, the Lagrange-type duality, Wolfe duality and Mond-Weir duality are discussed as special duality schemes in a unified interpretation. As applications, some special cases of the class of regular weak separation functions are discussed.

TBA

Donghui Li
South China Normal University
Email: dhli@scnu.edu.cn

TBA.

The Collusion and Corruption in Public Procurement Auctions

Zhe Chen
Sichuan University
Email: mazhechen@gmail.com

In this paper, we consider a kind of special collusion in public procurement auctions, which is formulated by a corrupt officer, a mercenary agent and a dishonest supplier. The public procurement auctions are administered by the officer, who colludes with the agent to manipulate their evaluation of contract proposals in exchange for bribes. We introduce the definition on manipulation ability of the agent; and characterize the bidding strategies of suppliers with different levels of the manipulation ability. And then we make analysis on the expected utilities of the buyer in different environments. Finally, we find there exists an optimal auction rule for the buyer not only to prevent the collusion but also to choose an efficient supplier.

Application of the Generalized Augmented Lagrangian Method to Complementarity Problems Arising from Fiance

Kai Zhang
International Business School
Shenzhen University
Email: kaizhang@szu.edu.cn

It is well-known that the standard American option pricing problem can be formulated as a linear Complementarity Problem (CP). Moreover, this CP can be solved efficiently by lower order penalty method. In this talk, we will give some new complicated CPs arising from finance, which includes some nonlinear CPs, Mixed CPs, HJB-CPs, Option Games. Moreover, we will apply the generalized augmented Lagrangian method (including penalty method and generalized multiplier method) to solve these complicated CPs. Finally, some difficulties in this application will be discussed.

Linearized Proximal Algorithms for Convex Composite Optimization with Applications

Yaohua Hu
College of Mathematics and Computational Science
Shenzhen University
Email: hyh19840428@163.com

In this paper, we propose a linearized proximal algorithm (LPA) to solve a convex composite optimization problem. Each iteration of the LPA is a proximal minimization on the composition of the outer function and the linearization of the inner function at current iterate. The LPA has the attractive computational advantage in that the solution of each subproblem is a singleton, which avoids the difficulty of finding the whole solution set of the subproblem, as in the Gauss-Newton method (GNM), while it still maintains the same local convergence rate as that of the GNM. Under the assumptions of local weak sharp minima of order p ($p \in [1, 2]$) and the quasi-regularity condition, we establish the local superlinear convergence rate for the LPA. We also propose a globalization strategy for the LPA based on the backtracking line-search and an inexact version of the LPA, as well as the superlinear convergence results. We further apply the LPA to solve a feasibility problem, as well as a sensor network localization problem. Our numerical results illustrate that the LPA meets the demand for a efficient and robust algorithm for the sensor network localization problem.