NSC-NWO joint seminar on

Generalized Convexity in Game Theory

NSYSU, Kaohsiung, Taiwan, August 20, 2009.

Room 3001, Department of Applied Mathematics, National Sun Yat-sen University
高雄市中山大學應用數學系 理 3001 教室

2009.8.20 (星期四 Thursday)

9:30 Opening 開幕式 (chair: Jen-Chih Yao 姚任之)

9:40-10:30 Theo Driessen (University of Twente, Netherlands)
A survey on (average-, sub-, total-, permutational-) convexity notions incooperative game theory and examples

10:30-10:45 Coffee and Tea 休息;

10:45-11:30 Wei-Shih Du 杜威仕 (National Kaohsiung Normal University, Taiwan)
Hybrid inclusion and disclusion systems with applications to equilibria and parametric optimization;

11:30-12:15 Anna Khmelnitskaya (St.Petersburg, Russia)
On 1-convexity and nucleolus of co-insurance games

12:15-14:00 Lunch 午餐

14:00-14:45 Shaohua Pan 潘少華 (South China University of Technology, China)
Symmetric cone complementarity problems and C-functions

14:45-15:00 Coffee and Tea 休息

15:00-15:45 Hans Peters: (University of Maastricht, Netherlands)
On convexity of the undominated set for games with transferable utility

15:45-16:30 Jean Derks: (University of Maastricht, Netherlands)
On the core and Weber set for restricted cooperative games, and their coincidence for convex games

16:00-16:45 Coffee and Tea 休息

16:45-17:30 Chong Li 李 沖 (Zhejiang University, China)
Kantorovich's theorems of Newton's method for mappings and optimization problems on Lie groups.

17:30- Closing 閉幕式 (chair: Theo Driessen)

Abstract.

A survey on (average-, sub-, total-, permutational-) convexity notions and convex games in cooperative game theory

Theo Driessen
Dept. of Applied Mathematics,
University of Twente, The Netherlands

The core equivalence theorem for convex cooperative games has been established in two stages by Lloyd S. Shapley (1971) and Tatsuro Ichiishi (1981). Appealing examples of convex games were discovered in the eighties, together with additional characterizations of convexity, like a third stage by Rafels (1991). In the nineties adapted convexity notions, called average convexity, subconvexity, total convexity, and permutationally convexity, were introduced, which are surveyed and discussed with respect to the relationship to their core.

Hybrid inclusion and disclusion systems with applications to equilibria and parametric optimization

Wei-Shih Du 杜威仕
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In this paper, we first establish the existence theorems of the solution of hybrid inclusion and disclusion systems, from which we study mixed types of systems of generalized quasivariational inclusion and disclusion problem. Some applications of existence theorems to feasible points for various mathematical programs with variational constraints, system of vector saddle point and system of minimax theorem are also given.

On 1-convexity and nucleolus of co-insurance games

Anna Khmelnitskaya
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Russian Academy of Sciences, St. Petersburg, Russia

We consider the situation in which a risk is evaluated too much heavy for a single insurance company, but it can be insured by the finite set of companies that share the risk and the premium. Such an insurance situation is modeled through a cooperative TU game, the so-called co-insurance game, first introduced in Fragnelli and Marina (2004). We study the non-emptiness and the structure of the core and the nucleolus of the co-insurance game subject to the premium value. If the premium is large enough, the core is empty. If the premium meets a critical upper bound, the non-emptiness of the core, being in this case a single allocation composed of player's marginal contributions, turns out to be equivalent to the so-called 1-convexity property of the co-insurance game. Moreover, if non-emptiness applies, the co-insurance game inherits the 1-convexity property while lowering the premium till a critical lower bound induced by the individual evaluations of the enormous risk. In addition, 1-convexity of the co-insurance game yields the linearity of the nucleolus which, in particular, appears to be a linear function of the variable premium. If 1-convexity condition does not apply, then for the premium below another critical number we present an algorithm for computing the nucleolus.

The paper is coauthored with Theo Driessen, Vito Fragnelli, Ilya Katsev

Symmetric cone complementarity problems and C-functions

Shaohua Pan 潘少華
Department of Mathematics,
South China University of Technology, China.

In recent years, symmetric cone optimization becomes an active research topic in the field of optimization. In this talk, we will introduce several classes of symmetric cone complementarity problems and the associated complementarity functions (C-functions for short), especially for second-order cone complementarity problems and the SOC complementarity functions. Some open problems related to C-functions are also presented.

On the convexity of the undominated set for cooperative games with transferable utility

Hans Peters
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We introduce and study a new set-valued solution concept for games with transferable utility, called the `undominated set'. For balanced games the undominated set coincides with the core and for anti-balanced games with the anti-core. In this respect, it exhibits a coalitional fairness property: if one coalition gains, then all coalitions should gain (if possible); and if one coalition loses then all coalitions should lose (if possible). The undominated set is defined by considering the (ex ante) possibility of sidepayments between coalitions and the (ex post) possibility of sidepayments with respect to proposals (pre-imputations) that are on the bargaining table. Undominated allocations (proposals) are those allocations that are cannot be Pareto dominated for the coalitions by using such sidepayments, under the assumption of complete uncertainty whether or not agreement is going to be reached. We characterize the undominated set by balancedness conditions and study its possible properties: convexity, connnectedness, contractibility.

On the core and Weber set for restricted cooperative games and their coincidence for convex games

Jean Derks
Dept of Mathematics,
University of Maastricht, The Netherlands

For standard cooperative games the core is contained in the convex hull of its marginal contribution allocations, also known as the Weber set. Coincidence of both sets holds exactly when the cooperative game is convex. In general these results cannot be extended to the restricted case, i.e., when not all coalitional worths are known, and thus, properties have to be imposed on the set of coalitions with known worth, also referred to as the feasible coalitions. We present some examples of the new model where the extensions of the standard results fail to hold, and provide an overview of properties on the feasible coalitions for which extensions of the standard results are attained.

Kantorovich's theorems of Newton's method for mappings and optimization problems on Lie groups

Chong Li 李 沖

Department of Mathematics,
Zhejiang University, China

. With the classical assumptions on *f*, a convergence criterion of Newton's method (independent of affine connections) to find zeros of a mapping *f* from a Lie group to its Lie algebra is established, and estimates of the convergence domains of Newton's method are obtained. Applications to optimization on Lie group are provided and some recent results are extended and improved accordingly.