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Automatic
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The Department of Automatic Control & Systems Engineering
is pleased to announce the following seminar:

Constructing and computing equilibria for two-player games

Professor von Stengel

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London School of Economics*

Wednesday, 2 March 2016 at 14:00

LT02, Sir Henry Stephenson Building

Abstract

A bimatrix game is a two-player game in strategic form, a basic model in game theory. A Nash equilibrium is a pair of (possibly randomized) strategies, one for each player, so that no player can do better by unilaterally changing their strategy. We give an introduction to the structure of Nash equilibria of bimatrix games based on best-reply regions derived from the payoff matrices. The corresponding mathematical objects are two polytopes for the two players and their combinatorial properties. With this geometric insight, one can construct games with certain properties, and understand algorithms for computing equilibria. We explain the classic Lemke-Howson algorithm, a pivoting method similar to the simplex algorithm for linear programming, that finds one Nash equilibrium. It also shows that a generic game has an odd number of equilibria.

We describe a class of square bimatrix games for which the shortest Lemke-Howson path grows exponentially in the dimension d of the game. We construct the games using pairs of dual cyclic polytopes with $2d$ facets in d -space and a suitable "labelling" of their facets.

The latter result is joint work with Rahul Savani, in: R. Savani and B. von Stengel (2006), Hard-to-Solve Bimatrix Games. *Econometrica* 74, 397-429.

Biography

Bernhard von Stengel is Professor of Mathematics at the London School of Economics which he joined in 1998, after studies in Germany and the USA. He is interested in the geometry and computation of Nash equilibria and other mathematical questions of game theory.