Matching game and stable roommates problem with payments

Péter Biró
IEHAS

Abstract

Eriksson and Karlander (2001, IJGT) introduced the *stable roommates problem with payments* with the following illustrative example. Consider a group of tennis players that will participate in a doubles tennis tournament. Suppose that each pair of players can estimate the expected prize money they could win together if they form a pair in the tournament. Also suppose that each player is able to negotiate his share of the prize money with his chosen partner, and that each player wants to maximize his own prize money. Can the players be matched together such that no two players have an incentive to leave the matching in order to form a pair together? In *matching games* the situation is slightly different. Here groups of possibly more than two players can distribute their total prize money among each other, and the solution is required to be stable against the deviation by any group of players. Thus this problem is the nonbipartite generalisation of the *assignment game*.

In this talk we will survey the main results of two recent papers. The first one (Péter Biró, Walter Kern and Daniel Paulusma: Computing solutions for matching games. International Journal of Game Theory 41(1), 75-90 (2012).) deals with the matching game. We present an efficient algorithm that tests if the core of a matching game is nonempty and computes a core element if the core is nonempty. We also show how the nucleuos can be calculated efficiently for games with nonempty cores. In our second paper we focus on the stable roommates problem with payments. We show the existence of paths to stability, which means that assuming that a stable solution exists one can always reach a stable solution by successively satisfying blocking pairs. This result can be essentially deducted from a general theorem by Kóczy and Lauwers (2004, GEB) on the accessibility of the core. However, we need a different algorithm and a careful analysis in order

to get a linear upper bound on the number of steps needed to achieve stability.