Guangzhou Discrete Mathematics Seminar

An introduction to algorithmic combinatorial game theory

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14 June 2024 (Friday), 4pm to 5pm
Room 406, School of Mathematics, Sun Yat-sen University
Tencent meeting ID: 470 018 171

In this talk, we give a brief introduction to algorithmic combinatorial game theory. A combinatorial game is a two-player game with no random elements or hidden information. The computational complexity of games is considered in algorithmic combinatorial game theory which shows the hardness of the games. Burke and Teng [Internet Mathematics 5(4) (2008) 477–492] introduced a two-player combinatorial game Atropos based on Sperner's lemma, and showed that deciding whether one has a winning strategy for Atropos is PSPACE-complete. In the original Atropos game, the players must color a node adjacent to the last colored node. Burke and Teng also mentioned a variant Atropos-k in which each move is at most of the distance k of the previous move. We prove that for any fixed integer k ($k > 1$), Atropos-k is PSPACE-complete. This is joint work with Chao Yang.

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