Colloquium on Combinatorial Computing
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Testing for a theta

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Abstract

Recently a few new results appeared, providing polynomial time algorithms for testing if a given graph contains certain induced subgraphs (such as "pyramids", odd odd cycles and anticycles, and some others). However, some seemingly similar problems (such as testing for the presence of an induced cycle passing through two given vertices, or testing for "prisms") are known to be NP-complete. At the moment it is not clear what causes this difference.

A "theta" is a graph consisting of three vertex disjoint induced paths between two fixed vertices (the "ends"), such that there are no edges between the interiors of different paths. In joint work with Paul Seymour we were able to find a polynomial time algorithm to test if a graph contains a theta. In fact, we prove that a graph G does not contain a theta with a given end v, if and only if G has a certain structure; which can be tested for in polynomial time.

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http://www.math.nyu.edu/p̃ach/public_html/combinatorics_seminar.html