

Princeton Discrete Math Seminar

Thursday, October 18th

Department of Mathematics

2:15-3:15pm

Fine Hall, Room 224

A nearly linear time algorithm for testing membership in minor closed families of graphs

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A model of a graph H in a graph G consists of a set of disjoint trees indexed by the vertices of G such that if uv is an edge of H then there is an edge of G joining T_u and T_v . We say that H is a minor of G if G contains a model of H . Many classes of graphs are closed under the taking of minors. For example G is planar precisely if it has neither $K_{3,3}$ nor K_5 as a minor. For fixed H , Robertson and Seymour gave an $O(|V(G)|^3)$ algorithm to determine if G has H as a minor, and if so to find a model of H in G .

We present a nearly linear time algorithm for the same problem. Our algorithm also constructs a well-behaved decomposition of an input G which has no H -minor which can be used to solve a variety of optimization problems on such a graph.

This talk avoids technical details as much as possible. Much of it is a gentle introduction to some of the ideas involved in this area.