

TRIPLES IN MATROID CIRCUITS

Jim Geelen

`jim.geelen@uwaterloo.ca`

University of Waterloo

Two elements in a matroid are in a circuit if and only if they are in the same component. Determining which triples are in a matroid circuit is a surprisingly interesting and difficult problem. For example, Seymour proved the astounding result that, for a vertically 4-connected binary matroid, if there is a triple that is not contained in a circuit, then the matroid is the cycle-matroid of a graph and the three elements are incident with a common vertex in that graph. I love that result; it beggars belief that graphic matroids can materialize from such mild hypotheses! For general matroids, presented via a rank-oracle, one cannot efficiently determine whether or not three given elements are in a circuit. For representable matroids the problem remains open, but there is a significant generalization of Seymour's theorem, and that result plays a central role in the matroid-minors project.

In this talk I will explain the connection to the matroid-minors project, and will sketch a simple proof of Seymour's result. The new proof is joint work with Roger Fu and the generalization of Seymour's result is older joint work with Bert Gerards and Geoff Whittle.