

Beyond Grötzsch's theorem

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Abstract

Grötzsch's theorem states that every triangle-free planar graph is 3-colorable. We give a short proof of Grötzsch's theorem and a refinement that leads to a linear-time algorithm to 3-color triangle-free planar graphs. This is joint work with Zdeněk Dvořák and Ken-ichi Kawarabayashi.

In the second part of the talk we discuss the following theorem. There exists an absolute constant c such that if G is a 4-critical triangle-free graph drawn on a surface of Euler genus g , then G has at most cg faces of length at least five, each of length at most cg . This implies a theorem of Thomassen that there are only finitely many 4-critical graphs of girth at least five on any given surface. The second part is joint with Zdeněk Dvořák and Daniel Král.