Geometry Seminar
March 25, 2003, Tuesday, 6:00 p.m.
Room 613, Courant Institute
251 Mercer Street, New York

Relaxing planarity for topological graphs

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Abstract

According to Euler's formula, every planar graph with n vertices has at most $O(n)$ edges. How much can we relax the condition of planarity without violating the conclusion? After surveying some classical and recent results of this kind, we prove that every graph of n vertices, which can be drawn in the plane without three pairwise crossing edges, has at most $O(n)$ edges. This generalizes a result of Agarwal et al. who proved the statement for straight-line drawings.

We will also show that for any constants k, l, there exists another constant $C(k, l)$, such that if G has at least $C(k, l)n$ edges, then it contains a $k \times l$-gridlike configuration, that is, it contains $k + l$ edges such that each of the first k edges crosses each of the last l edges. Moreover, one can require the first k edges to be incident to the same vertex.

Joint work with J. Pach, R. Pinchasi, R. Radoicic, M. Sharir.

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