Geometry Seminar
April 1, 2008, Tuesday, 6:00 p.m.
Room 613, Courant Institute
251 Mercer Street, New York

20 years of EPT graphs: edge intersection graphs of paths in a tree

Martin Charles Golumbic
Haifa University

Abstract

Let P be a collection of nontrivial simple paths on a host tree T. The edge intersection graph of P, denoted by $EPT(P)$, has vertex set that corresponds to the members of P, where two vertices are joined by an edge if and only if the corresponding members of P share at least one common edge in T. An undirected graph G is called an *edge intersection graph of paths in a tree* if $G = EPT(P)$ for some P and T. The EPT graphs can be useful in network applications. Scheduling undirected calls in a tree network or assigning wavelengths to virtual connections in an optical tree network are equivalent to coloring its EPT graph.

In this lecture, we will survey the mathematical and algorithmic results on EPT graphs and some of their generalizations. The class of EPT graphs was first investigated by Golumbic and Jamison in two papers appearing in 1985, and subsequently, further research has been carried out by a number of algorithmic graph theorists. On the algorithmic side, the recognition and coloring problems are NP-complete, whereas the maximum clique and maximum stable set problems are polynomially solvable. On the mathematical side, for example, it was shown 20 years ago, that the EPT graphs restricted to host trees of vertex degree 3 are precisely the chordal EPT graphs. A new analogous result by Golumbic, Lipshteyn and Stern is that weakly chordal EPT graphs are precisely the EPT graphs with host tree restricted to degree 4. A complete hierarchy of related graph classes will also be presented, including the k-EPT graphs in which paths must share at least k edges of the tree in order to generate an edge in the k-EPT graph.

For further information contact {pach,pollack}@cims.nyu.edu, or visit our website: http://www.math.nyu.edu/seminars/geometry_seminar.html