Combinatorics Seminar

On the Inertia Set of a Graph

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Abstract: For an undirected graph $G = (V, E)$ with $V = \{1, \ldots, n\}$, let $S(G)$ be the set of all symmetric $n \times n$ matrices $A = [a_{i,j}]$ with $a_{i,j} \neq 0$, $i \neq j$, if and only if ij is an edge. The inertia of a symmetric matrix is the triple (p_+, p_-, p_0), where p_+, p_-, p_0 are the number of positive, negative, and null eigenvalues respectively. The inverse inertia problem asks which inertias can be obtained by matrices in $S(G)$. This problem has been studied intensively by Barrett, Hall, and Loewy. In this talk I will present new results on the inverse inertia problem, among them a Colin de Verdière type invariant for the inertia set (this is the set of all possible inertias) of a graph, a formula for the inertia set of a graph with a 2-separation, and the inertia set of the join of a collection of graphs.

The Colin de Verdière type invariant for the inertia set is joint work with F. Barioli, S.M. Fallat, H.T. Hall, D. Hershkowitz, L. Hogben, and B. Shader, and the inertia set of the join of a collection of graphs is joint work with W. Barrett and H.T. Hall.

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Mathematics and Computer Science
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