

COLLOQUIUM

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The Minimum Rank of Universal Adjacency Matrices



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Abstract: For a simple graph G on n vertices, a matrix of the form $U(a, b, c, d) = aA + bI + cJ + dD$, where A is the 0,1-adjacency matrix of G , J is the all ones matrix of size n , I is the identity matrix of size n , and D is the diagonal matrix with the degrees of the vertices in the main diagonal, and a (not zero), b , c , d are scalars, is called a *universal adjacency matrix* of G . An analogous parameter to the minimum rank of a given graph G is the minimum rank over all matrices in the set of universal adjacency matrices of G . This parameter is called the minimum universal rank of G , and is denoted by $\text{mur}(G)$. Graphs with $\text{mur}(G)$ equal to zero and one are characterized. The minimum universal rank of some families of graphs such as complete graphs, complete bipartite graphs, paths and cycles are presented. A formula for the minimum universal rank of a regular graph is given. Finally, it is shown that $\text{mur}(G)$ is not monotone on induced subgraphs.

This is joint work with Discrete Mathematics Research Group at the University of Regina.