Title: Inverses of graphs and reciprocal eigenvalue properties

Abstract

In Combinatorial Matrix Theory, the study of graph structures via different properties of matrices associated with it is an interesting and popular topic. Among the various matrices associated with a graph, the adjacency matrix is probably the most popular and widely investigated one.

A graph G is *nonsingular* if its adjacency matrix $A(G)$ is *nonsingular*. The *inverse* of a nonsingular graph G, when it exists, is the unique weighted graph whose adjacency matrix is signature similar to $A(G)^{-1}$. The inverse graph of an invertible graph G is denoted by G^+. A nonsingular graph G satisfies *reciprocal eigenvalue property* or *property R* if the reciprocal of each eigenvalue of the adjacency matrix $A(G)$ is also an eigenvalue of $A(G)$ and G satisfies *strong reciprocal eigenvalue property* or *property SR* if the reciprocal of each eigenvalue of the adjacency matrix $A(G)$ is also an eigenvalue of $A(G)$ and they both have the same multiplicities. In many ways these two concepts are related to each other. Both of these play important roles in Quantum Chemistry. In this talk, we will study graph structure with regard to the concept inverse graph and reciprocal eigenvalue properties.