

Discrete Mathematics Seminar

Time: Friday, 1 April 2011, 1:10–1:45 PM
Location: 238 Derrick Hall
Title: Sum Rules for the Resistance Distance
Speaker: Dr. Yujun Yang,
Mathematical Chemistry Group, Texas A&M University at Galveston
School of Mathematics and Information Science, Yantai University, China

Abstract:

Let G be a connected graph. The resistance distance between any two vertices of G is defined as the net effective resistance between them if each edge of G is replaced by a unit resistor.

In this talk, first of all, we establish a pair of general sum rules for resistance distances in G . Then for any $S \subseteq V(G)$ such that all vertices in S have the same neighborhood N in $G - S$ and $2 \leq |S| \leq 4$, by these rules, we derive simple formulae for resistance distances between vertices in S in terms of the cardinality of N , which indicates that resistance distances between vertices in S depend only on the cardinality of N and the induced subgraph $G[S]$. One question arises naturally: does this property hold for S with arbitrarily many vertices? Finally, we answer this question by the following reduction principle: resistance distances between vertices in S can be computed as in the subgraph obtained from $G[S \cup N]$ by deleting all the edges between vertices in N .