Underlying Split Multigraphs

Allison Desmond, John T. Saccoman*, Seton Hall University

A split graph is a graph in which the nodes can be partitioned into a clique and an independent set (whose nodes are called cones). A split graph G is *proper* if every cone has the same degree. We have defined an x-Ideal Proper Split Graphs, $x - IPS(c; d; b)$, as split graphs with c cones, each of degree d, having an x-grouping of cone nodes adjacent to the same d clique nodes, and b clique nodes not adjacent to any cones, and presented formulas for Laplacian Eigenvalues for infinite families of these graphs (i.e., *On a class of non-Threshold Laplacian Integral Split Graphs*, [Fuller and Saccoman, Congressus Numerantium Vol. 220 (2014), pp. 5-16). We present a formula for the Laplacian eigenvalues of a constructed family of multigraphs whose underlying graph is x-Ideal Proper Split and whose clique has all edges of the same multiplicity $\mu > 1$.

Keywords: split graphs, spanning trees, eigenvalues, Laplacian matrix, multigraphs