

Discrete Mathematics Seminar

Time: Friday, 23 September 2011, 12:30–1:30 PM

Location: 238 Derrick Hall

Title: An Oriented Hypergraphic Approach to Algebraic Graph Theory

Speaker: Dr. Lucas Rusnak, Mathematics Department

Abstract:

Oriented hypergraphs are an oriented incidence structure that extends the concepts of graphs and signed graphs. We demonstrate that the ij^{th} entry of the signed adjacency matrix of an oriented hypergraph is the aggregate number of signed vertex-walks between vertices v_i and v_j .

We also show that, as in the case of graphs, the Laplacian matrix of an oriented hypergraph can be interpreted as either the difference of its degree and signed adjacency matrices, or as the product of its incidence matrix and its transpose. Moreover, the familiar line graph results can be replaced by incidence duality.

Finally, we will discuss a direct combinatorial interpretation of the entries of the Laplacian using the concept of *signed weak walks*.

This is joint work with Nathan Reff at Binghamton University.