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Discrete Mathematics Seminar

Time: Friday, Nov 13, 2020, 2:15--3:15 PM (Central Time)
Title: The Norton algebras of some distance regular graphs
Speaker: Dr. Jia Huang, Department of Mathematics and Statistics, University of Nebraska at Kearney
Zoom Link: https://txstate.zoom.us/j/95566530916?pwd=OGI4NlNJN1U0UUlROU9ML1MxUjdmZz09
                 ID: 955 6653 0916
                 Passcode: **753321**

Abstract:

Distance regular graphs are certain highly-symmetric graphs with many nice properties. In particular, a distance regular graph has a diagonalizable adjacency matrix whose eigenvalues (with multiplicities) can be determined based on certain parameters of the graph. One can also define a product on each eigenspace of a distance regular graph by projecting the entry-wise product of two eigenvectors back to this eigenspace. The resulting algebra is known as the \emph{Norton algebra}, which is commutative but not associative in general. The Norton algebras are studied in finite group theory due to their interesting automorphism groups.

We determine the Norton algebras of the Hamming graphs and some other families of distance regular graphs via a linear character approach, as these graphs are all Cayley graphs of finite abelian groups. We investigate the automorphism groups of these Norton algebras and combinatorially determine the extent to which their product is nonassociative. We also initiate the study of the Norton algebras of those distance regular graphs which are not necessarily Cayley graphs, such as the Johnson graphs.

Bio:

Jia Huang received his Ph.D. from the University of Minnesota in 2013. His dissertation was on combinatorial representation theory. He is currently an Associate Professor at the University of Nebraska Kearney. He has wide interests in algebra and discrete mathematics. He has done research work in algebraic combinatorics, enumerative combinatorics, graph theory, and modular invariant theory. See his webpage https://www.unk.edu/academics/math/faculty-staff/dr-jia-huang.php for more information.