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Lucas J. Rusnak*, Department of Mathematical Sciences, Binghamton University, Binghamton, NY 13902. *Oriented Hypergraphs and the Structure of Rational Matrices.*

An *oriented hypergraph* is an oriented incidence structure which extends the concept of a signed graph. Just as signed graphs provide a model for $\{0, \pm 1\}$ -matrices with exactly two non-zero entries in each column, an oriented hypergraph provides a similar model for any rational matrix. I will survey the current state of the theory of oriented hypergraphs and the progress made towards the circuit classification of rational matrices.

Topics discussed will include a brief introduction of new hypergraphic structures and operations relevant to the classification of column dependencies of rational matrices, the decomposition of oriented hypergraphs into three families of varying degrees of “balance”, the identification of the minimal hypergraphic obstructions to balanceability, and the current state of the circuit classification theorem for rational matrices. (Received June 08, 2010)