

Meeting: 1009, Annandale-on-Hudson, New York, SS 8A, Special Session on Invariants of Graphs and Matroids

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Functions*. Preliminary report.

Natural generalizations of the Tutte polynomial and deletion/contraction decomposition expressions are obtained when we restrict deletion/contraction to elements not in a distinguished subset we call ports. These expressions include symbols that signify connected unoriented or oriented matroids on subsets of ports. We survey new and old algebraic identities, product operations and transformations on such expressions that correspond to various operations on, and combinations of, unoriented or oriented matroids. Some of the identities correspond to identities on particular kinds of representations of the matroids. For example, the ported Tutte equations interpreted for a certain ported matroid-to-matroid function correspond to a non-commutative variant of the ported Tutte equations interpreted for matroid realizations expressed in exterior algebra. Other examples involve ported matroid union, its dual, and generalized parallel connection. The topic is related to resistive electrical network or random walk models, and to splitting formulas for Tutte polynomial computations on decomposed graphs. (Received August 11, 2005)