Fourientation activities and the Tutte polynomial: Extended abstract

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Abstract

A fourientation of a graph G is a choice for each edge of the graph whether to orient that edge in either direction, leave it unoriented, or biorient it. We may naturally view fourientations as a mixture of subgraphs and graph orientations where unoriented and bioriented edges play the role of absent and present subgraph edges, respectively. Building on work of Backman and Hopkins (2015), we show that given a linear order and a reference orientation of the edge set, one can define activities for fourientations of G which allow for a new 12 variable expansion of the Tutte polynomial TG. Our formula specializes to both an orientation activities expansion of TG due to Las Vergnas (1984) and a generalized activities expansion of TG due to Gordon and Traldi (1990).

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