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Co-parking functions and h-vectors of graphical matroids

The h-vector of a simplicial complex X is a well-studied invariant keeping track of the number of i -dimensional faces of X . When X is the independence complex of a matroid Stanley has conjectured that the h-vector is a 'pure O-sequence', i.e. the degree sequence of a monomial ideal generated in a single degree. The conjecture has inspired a good deal of research and is proven in some important cases (but open in general). Merino has established the conjecture for the case that X is a cographical matroid by relating the h-vector to properties of chip-firing on the underlying graph (via a Tutte polynomial evaluation). This approach has been further refined by studying bijections between the set of 'G-parking functions' and the set of spanning trees of G which preserve desired degree/inversion statistics. We introduce and study the notion of a 'coparking' function on a graph (and more general matroids) inspired by a dual notion of chip-firing, and use this to establish Stanley's conjecture for certain classes of graphical matroids.