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Lawrence polytopes and some invariants of a graph

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We use two dual Lawrence polytopes P and P^* of a graph G to study the graph. The h-vector of the graphic (resp. cographic) matroid complex associated to G coincides with the h^* -vector of the Lawrence polytope P (resp. P^*). In general, the h-vector is an invariant defined for an abstract simplicial complex, which encodes the number of faces of different dimensions. The h^* -vector, a.k.a. the δ -polynomial, is an invariant defined for a rational polytope obtained by dilating the polytope. By dissecting the Lawrence polytopes, we may study the h-vectors associated to the graph G at a finer level. In particular, we understand the reduced divisors of the graph G in a more geometric way.

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