

1030-05-182

Kurt W. Luoto* (kwluoto@math.washington.edu), University of Washington, Department of Mathematics, Box 354350, Seattle, WA 98195-4350. *Matroid base polytope decompositions and quasisymmetric functions.*

Matroid base polytope decompositions arise in the work of certain algebraic geometers. In 2006, Billera, Jia, and Reiner invented a new invariant $F(M)$ for matroids in the form of a quasisymmetric function. One motivating application of this invariant is to the study of matroid base polytope decompositions, since the mapping of matroids to the algebra of quasisymmetric functions (QSym) is a valuation on matroid base polytopes and so leads to a necessary algebraic condition on their decompositions. Billera, Jia, and Reiner posed several questions regarding this relationship.

We address some of these questions, obtaining a full characterization for the rank two case. Along the way, we obtain a novel \mathbb{Z} -basis for the quasisymmetric functions that has especially nice properties. For instance, this basis has nonnegative integer structure constants and reflects, in addition to the usual grading of QSym by degree, a second grading of QSym that on (the images of) loopless matroids coincides with their matroidal rank.

No familiarity with quasisymmetric functions or matroids are assumed for this talk. (Received August 01, 2007)