
JENYA SOPRUNOVA, Kent State University

Lattice Size of Polytopes

The lattice size $ls(P)$ of a lattice polytope P is the smallest integer l such that after a unimodular transformation P fits into the l -dilate of the standard simplex. The lattice size was introduced and studied by Schicho, Castryck, and Cools in the context of simplification of a parametrization of an algebraic surface.

We explain the connection of the lattice size of P to its successive minima and show that in the case of polygons a reduced basis computes the lattice size, which leads to a very fast algorithm for computing $ls(P)$.

We also provide an algorithm for finding a reduced basis in dimension 3, analyze its complexity, and explain the connection of the reduced basis to the successive minima. Although it is not true in dimension 3 that a reduced basis computes the lattice size, we show that for empty lattice tetrahedra there exists a reduced lattice basis that computes the lattice size. This is joint work with A. Harrison, A. Alajmi, and P. Tierney.