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Software for exact integration of polynomials over polyhedra. (English) Zbl 1259.65054

Summary: We are interested in the fast computation of the exact value of integrals of polynomial functions over convex polyhedra. We present speed-ups and extensions of the algorithms presented in previous work by some of the authors. We provide a new software implementation and benchmark computations. The computation of integrals of polynomials over polyhedral regions has many applications; here we demonstrate our algorithmic tools solving a challenge from combinatorial voting theory.

MSC:

65D32 Numerical quadrature and cubature formulas
41A55 Approximate quadratures
41A63 Multidimensional problems
65D18 Numerical aspects of computer graphics, image analysis, and computational geometry

Keywords: exact integration; volume computation; integration of polynomials; valuations; polyhedral computation; numerical examples; algorithm; combinatorial voting theory

Software: polymake; TRIP; LattE

Full Text: DOI arXiv