Optimization of composite cubature formulas on a lattice

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Quadrature and cubature formulas are widely used in various branches of mathematics and its applications. When obtaining a discrete approximation, i.e. cubature formula, it is important that the cubature formula approximates the given definite integrals as best as possible. Such cubature formulas can be obtained, for example, using variational principles. Therefore, when constructing lattice optimal cubature formulas in the Sobolev space by the variational method, this is one of the urgent problems of computational mathematics.

In the present paper, composite lattice optimal cubature formulas are constructed by the variational method in the Sobolev space. In addition, the square of the norm of the error functional of the constructed lattice optimal cubature formulas in the dual Sobolev space is explicitly calculated.