

Optimal point sets for quasi-Monte Carlo integration of bivariate periodic functions

Aicke Hinrichs, Johannes Kepler Universität Linz

We investigate quasi-Monte Carlo (QMC) integration of bivariate periodic functions with dominating mixed smoothness of order one. While there exist several QMC constructions which asymptotically yield the optimal rate of convergence of $\mathcal{O}(N^{-1} \log(N)^{\frac{1}{2}})$, it is yet unknown which point set is optimal in the sense that it is a global minimizer of the worst case integration error.

We will present a computer-assisted proof by exhaustion that the Fibonacci lattice is the unique minimizer of the QMC worst case error in periodic H^1_{mix} for small N . Moreover, we investigate the situation for pointsets whose cardinality N is not a Fibonacci number. It turns out that for $N=1,2,3,5,7,8,12,13$ the optimal point sets are integration lattices.