

Optimal Gaussian-weighted quadrature for functions having mixed smoothness

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We investigate optimal Gaussian-weighted quadrature for functions on \mathbb{R}^d belonging to the Gaussian-weighted Sobolev space $W_p^r(\mathbb{R}^d; \gamma)$ of mixed smoothness $r \in \mathbb{N}$ and for $1 \leq p < \infty$, where γ is the standard Gaussian measure. In the high dimensional case ($d > 1$), we prove the right convergence rate of optimal quadrature for $1 < p < \infty$ and upper bound of optimal quadrature for $p = 1$, and propose novel methods for constructing optimal quadratures based on new sparse grids. In the one-dimensional case ($d = 1$), we obtain the right convergence rate of optimal quadrature for $1 \leq p < \infty$. For detail see [1], [2].

- [1] D. Dũng, Numerical weighted integration of functions having mixed smoothness, *J. Complexity* **78**(2023) 101757.
- [2] D. Dũng and V. K. Nguyen, Optimal numerical integration and approximation of functions on \mathbb{R}^d equipped with Gaussian measure, *IMA Journal of Numerical Analysis* **44**(2024), 1242-1267.