

Sparse, Adaptive Quadrature Methods for Bayesian Inverse Problems of Parametric Operator Equations

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We present sparsity theory for PDEs with uncertain input parameters, related to recently developed, deterministic, high-order Quasi-Monte Carlo quadratures; specifically, we consider higher-order, interlaced polynomial lattice rules.

Admissible problems include (linear or semilinear) elliptic or parabolic partial differential equations with uncertain parameters, shape uncertainty and the corresponding Bayesian inverse problems.

A parametrization of the distributed uncertainty reduces the computational problem to an integration problem over infinite-dimensional parameter spaces. Based on a holomorphy condition on the parametric dependence, we present regularity estimates for the parametric integrand functions and for uniform prior measure on the parameter uncertainty.

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