

Stochastic Collocation Methods for Stochastic Partial Differential Equations Driven by White Noise

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We propose stochastic collocation methods for stochastic partial differential equations driven by white noise using the Stratonovich formulation. We approximate the Brownian motion with its spectral truncation, i.e. via the Karhunen-Loeve expansion. As we introduce a large number of random variables as time evolves, we adopt the sparse grid method of Smolyak type to further reduce the computational cost in random space. Applications of this approach include elliptic and hyperbolic equations. For advection-diffusion equation, we adopt a recursive formulation to achieve long-time integration. Numerical results will be also shown.