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A stochastic collocation method for delay differential equations with random input.

Summary: In this work, we concern with the numerical approach for delay differential equations with random coefficients. We first show that the exact solution of the problem considered admits good regularity in the random space, provided that the given data satisfy some reasonable assumptions. A stochastic collocation method is proposed to approximate the solution in the random space, and we use the Legendre spectral collocation method to solve the resulting deterministic delay differential equations. Convergence property of the proposed method is analyzed. It is shown that the numerical method yields the familiar exponential order of convergence in both the random space and the time space. Numerical examples are given to illustrate the theoretical results.

Keywords: delay differential equations; stochastic collocation; sparse grid; Legendre spectral method
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