

Surrogating stochastic simulators using spectral methods and advanced statistical modelling

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We view the stochastic simulator as a random field indexed over the input space. Many implementations of stochastic simulators allow that we fix the random seed of the computation to obtain a deterministic response. Keeping the random seed fixed and evaluating the stochastic simulator over the input space, we obtain a so-called (discrete) trajectory.

We propose a stochastic emulator which emulates not only the marginal distributions of the output at points in the input space, but is also able to generate full trajectories. Given several discrete trajectories, we approximate them by sparse polynomial chaos expansions and perform an extended Karhunen-Loeve expansion. The joint distribution of the random variables in the expansion are inferred by parametric inference of marginals and copulas. We demonstrate the performance of the method on a suitable application example.

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