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ADAPTIVE ISDE-BASED ALGORITHM FOR THE GENERATION OF NON-GAUSSIAN VECTOR-VALUED RANDOM FIELDS

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In this work, we address the construction of a random generator for non-Gaussian vector-valued random fields with values in some arbitrary bounded or semi-bounded subsets of $\mathbb{R}^n$ [2]. Such an issue typically arises in uncertainty quantification for complex systems and multiscale analysis, where the elliptic operators involve stochastic coefficients that may be identified by solving statistical inverse problems. The approach builts up on two main features. The first one is the construction of a family of auxiliary random fields converging, in some stochastic sense and at a user-controlled rate, towards the target random field. Each of these additional random fields is subsequently simulated by solving a family of Itô stochastic differential equations, in the spirit of [1]. The second aspect is the definition of an adaptive algorithm inspired from [3] and such that the integration step is refined on-the-fly whenever the particle reaches the neighboorhood of the admissible space. A few examples (including comparisons with reference generators) are finally provided so as to illustrate both the adaptivity and the convergence of the solutions.

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