

SPDE-based MCMC methods

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A well-known method to sample from a given target distribution on a finite dimensional space is to simulate the solution of a stochastic differential equation (SDE) which has the target distribution as its invariant measure. Assuming ergodicity of the SDE, the solution of the SDE at a “large” time can be used as an approximation to a sample from the target distribution.

If the target distribution lives on an infinite dimensional space, the situation is less clear, but it transpires that often one can still employ the same idea. We show how one can use SDEs with values in the space of continuous functions to sample from certain target distributions on this space. In the cases we consider, the sampling equation turn out to be stochastic partial differential equations (SPDEs).

In order to derive an implementable MCMC method from these results, one needs to discretise the resulting SPDEs. We give some preliminary results comparing different discretisation schemes for these equations.