An Efficient Discretization to Simulate the Solution of a Linear-Quadratic Stochastic Boundary Control Problem

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We present a fast, implementable discretization for the Dirichlet boundary control problem associated with the stochastic heat equation and show its space-time convergence with rates. After space-time discretization, the discrete optimality conditions involve the discretization of a backward SPDE, whose numerical solution is well-known to be costly since it requires the computation of conditional expectations. In this work, we give a reformulation of the discrete optimality conditions which avoids the need to simulate conditional expectations and therefore significantly reduces complexities if compared to regression-based simulation, while keeping the same convergence rate.

This is joint work with Fabian Merle, Andreas Prohl, and Yanqing Wang.