
Optimal control of rare events in diffusion processes

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Abstract

We study optimal control problems for rare events in diffusion processes with time scale separation. The aim is to devise novel efficient importance sampling strategies based on optimal controls that speed up the sampling of certain rare events and yield estimators for rare event statistics with small variance and good convergence properties. We will present the theoretical background of this approach, including its relation to large deviation rate functions and discuss its algorithmic realization.

However, in very high dimensions computation of the optimal controls is a significant challenge and thus model reduction techniques are required that help to reduce the problem to a low dimensions, e.g., to some reaction coordinates.

We will outline the algorithmic set-up for realizing model reduction for optimal control problems and discuss the resulting performance in application to some test systems.

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