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Model Reduction for Multiscale Stochastic Networks

Abstract

Stochastic models of cellular chemical reaction networks typically involve chemical species numbers and reaction rates varying over several orders of magnitude. In order to reduce the analytical and computational complexity of the model one can exploit the "multiscale" nature of these models arriving at approximate asymptotic models. In general, approximations will be "hybrid" in the sense that some components will be discrete, some diffusive, and some absolutely continuous. We present a diffusion approximation for the slowest reactions when the faster reactions follow and exponentially ergodic process.