

ACMS Applied Math Seminar

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108 Crowley Hall



Stochastic Modeling of Multiscale Biochemical Networks

Stochastic effects may play an important role in mathematical modeling of biological and chemical processes in case the copy number of some component involved in the system is small. This talk will present the recent work on stochastic modeling of biochemical networks. First, I will introduce a continuous-time Markov chain model for chemical reaction networks when the systems are well stirred. The relationship between the stochastic and deterministic models will be considered. This model is extended to describe reaction and diffusion in the spatially distributed systems. Next, multiscale algorithms for stochastic simulation of reaction-diffusion processes will be introduced, that couple different modeling schemes for better efficiency of the simulation. The algorithms apply to the systems including the region with a few molecules where a continuous-time Markov chain model is used and the region with a large number of molecules where stochastic partial differential equations (SPDEs) are applied.

The Department of Applied and Computational
Mathematics and Statistics

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