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Samul Isaacson*, 111 Cummington Mall, Boston, MA 02215. *Stochastic Reaction-Drift-Diffusion Methods for Studying Cell Signaling.*

Particle-based stochastic reaction-diffusion (PBSD) models are one approach to study biological systems in which both the noisy diffusion of individual molecules, and stochastic reactions between pairs of molecules, may influence system behavior. They provide a more microscopic model than deterministic reaction-diffusion PDEs or stochastic reaction-diffusion SPDEs, which treat molecular populations as continuous fields. The reaction-diffusion master equation (RDME) and convergent RDME (CRDME) are lattice PBSD models, with the latter providing a convergent approximation to the spatially-continuous volume-reactivity PBSD model as the lattice spacing is taken to zero. In this talk I will present several generalizations of the RDME and CRDME to support spatial transport mechanisms needed for resolving spatially-distributed cellular signaling processes, including drift due to background potentials, interaction potentials between molecules, and continuous-time random walks to approximate molecular transport on surfaces. (Received September 21, 2021)