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Systems with High Diffusivity Contrast: Treatment of Stochastic Force Matters ZHENG MA, GARY W. SLATER, University of Ottawa, UNIVERSITY OF OTTAWA TEAM — It has been suggested, based on computer simulations, that systems containing regions with drastically different diffusivity could be used for controlled drug delivery. However, these studies neglect the fact that for particles diffusing in inhomogeneous media, the particular interpretation of the stochastic force has a significant impact. We present systematic investigations of several such systems using Lattice Monte-Carlo (LMC) methods based on Ito, Stratonovich and isothermal calculus. We find that even for moderate diffusivity contrast (~ 100), different calculi predict distinct distributions of particles among regions. Results of previous work that implicitly use Ito calculus (without physical justification) crucially rely on particles accumulating in the low diffusivity medium, which is not observed for all choices of calculi. We argue that a proper choice of calculus, depending on the microscopic origin of the diffusivity contrast, must be made before any convincing conclusion can be drawn about what might constitute a promising candidate system for controlled drug delivery.

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