Monte Carlo approaches for a particle at a diffusivity interface and the "Ito-Stratonovich dilemma" MYKYTA V. CHUBYNSKY, HENDRICK W. DE HAAN, GARY W. SLATER, Department of Physics, University of Ottawa, Canada — Diffusion of a particle in a fluid is often described by the overdamped Langevin equation (OLE). However, when the fluid is inhomogeneous, the stochastic term in the OLE is ambiguous (the "Ito-Stratonovich dilemma"). Different interpretations of this term correspond to different stochastic calculi that may be appropriate in different physical situations. Concentrating on the case when two fluids with different viscosities are separated by a sharp interface, we develop two lattice Monte Carlo algorithms, both giving the choice between calculi (including Ito, Stratonovich, and "isothermal"). We validate the algorithms considering a 1D system with the interface in the middle between two walls and particles starting at the interface and comparing the simulation results to both theory and molecular dynamics simulations, with Langevin Dynamics corresponding to isothermal and Brownian Dynamics to Ito calculi. This simple system turns out to have surprisingly rich behavior. The algorithms have also been applied to a model of polymer translocation.

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