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*Fast Spectral Methods for Fokker-Planck Equation of the FENE Model.*

The Fokker-Planck equation of the FENE model is an evolution equation of a probability distribution function(PDF) in a sphere (for 3D case) or a disk (for 2D case) with unbounded drift. We propose several very fast and accurate spectral methods for this equation. All the methods properly handle the drift singularity near the boundary and the mapping singularity at the pole, and conserve the momenta of the PDF. The complexity of those methods is linear for 2D case and is very close to linear for 3D case, and all methods have spectral accuracy. (Received January 24, 2010)