Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Evaluating the Applicability of the Fokker-Planck Equation for Polymer Translocation JAMES POLSON, TAYLOR DUNN, University of Prince Edward Island — Computer simulation methods are used to study the dynamics of polymer translocation through a nanopore for a coarse-grained model. The variation of the translocation time distributions with nanopore friction strength is examined using Brownian dynamics simulations. The distributions are analyzed using the Fokker-Planck (FP) formalism together with free energy functions explicitly calculated using Monte Carlo simulations. When the pore friction is weak, translocation is rapid and the polymer is not conformationally relaxed. In this regime, the FP equation yields quantitatively poor predictions. By contrast, in the limit of sufficiently strong pore friction, the translocation is slow and the polymer maintains a state of conformational quasi-equilibrium. In this regime, the theoretical predictions for both driven and non-driven translocation are in good agreement with the simulation results.

James Polson
University of Prince Edward Island

Date submitted: 14 Nov 2013 Electronic form version 1.4