

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Incremental Mean First Passage Analysis of Unbiased Polymer Translocation¹ GARY W. SLATER, HENDRICK W. DE HAAN, University of Ottawa — To provide a measure of how translocation progresses, we have recently developed a method of mapping the process as a series of mean first passage processes of increasing displacement. Starting with a simplified, “quasi-static” model of translocation, exact numerical and analytic calculations using this Incremental Mean First Passage Time (IMFPT) approach yield insight into the robustness of the scaling of the translocation time τ with polymer length N given by $\tau \sim N^2$ as predicted in early theoretical studies of translocation. This approach reveals fundamental differences in the dynamics between absorbing and reflective boundary conditions when only one monomer is in the pore - both experimentally relevant scenarios. IMFPT is also applied to Langevin Dynamics simulations of a full polymer to test the impact of including features neglected in the simplified model. While the scaling for much of the process is now $\tau \sim N^{2.2}$ due to internal degrees of freedom, the exponent as measured by only the net translocation time is shown to depend greatly on the details of the simulation setup as a result of non-equilibrium effects.

¹Funded by NSERC.

Gary W. Slater
University of Ottawa

Date submitted: 18 Nov 2010

Electronic form version 1.4