Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Modeling DNA unhooking from a single post as a translocation process NABIL LAACHI, JAESEOL CHO, KEVIN DORFMAN, University of Minnesota-Twin Cities — We will present theoretical results on the stochastic unhooking of a long DNA chain from an isolated, stationary micropillar obtained by mapping the unhooking process to the translocation of a long chain through a nanopore. We show how stochastic methods, developed for DNA translocation, can thus be utilized to study chain-post unhooking. In particular, implementing such methods leads to the full probability distribution of the unhooking time and the ensuing moments in a fast and efficient manner for a wide range of chain and field parameters. The results thus obtained compare favorably to more realistic (and computationally intense) Brownian Dynamics simulation data, indicating that the finite size of the insulating micropillar and the elasticity of the DNA make at most a small contribution to the dynamics. We will also address the relevant electric fields and time scales for this process, making a connection between the theoretical data obtained here and experimental separations.

Nabil Laachi
University of Minnesota-Twin Cities

Date submitted: 30 Nov 2008 Electronic form version 1.4