Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

A hydrodynamic model for DNA translocation in a nanopore[1]
LEI CHEN, A.T. CONLISK, the Ohio State University — One of the recent applications of nanopores is the possibility to use them as detectors and even analyzers for (bio)molecules. A hydrodynamic model is established to investigate the translocation velocity of an electrokinetically driven DNA through a nanopore. Previous work done on this problem does not consider the globular part of the DNA residing outside the pore and can not account for the dependence of the translocation velocity on DNA length as shown in the experimental data. In the present work, the drag force acting on the blob-like DNA configuration outside the pore is considered by using the formula for flow past a porous sphere. There is an electroosmotic flow inside the nanopore and the velocity field inside the nanopore is calculated. The force balance on the DNA is used as an additional condition to determine the translocation velocity. The numerical results compare well with experimental data.

[1]Supported by National Science Foundation, NSEC, Center for Affordable Nanoengineering of Polymeric Biomedical devices.

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Date submitted: 31 Jul 2008 Electronic form version 1.4