Abstract Submitted
for the OSF10 Meeting of
The American Physical Society

Dynamics of linear polymers in a microchannel fluid flow
PRASENJIT BOSE, PETRU FODOR, MIRON KAUFMAN, Cleveland State University — Examination of the dynamics of polymers in a fluid flow is an important topic of research because of potential biomedical applications. We simulated the motion of a linear polymer caried in a laminar fluid flow inside a rectangular channel. Our model polymer is made up of beads which are connected by springs. When the polymer is released in the fluid elastic and advection forces act on each bead. The Newton's 2nd law for each bead is integrated numerically using 4th order Runge-Kutta technique. The dynamics of this nonlinear mechanical system depends on the values of the spring equilibrium distance (a), mass of a bead (m), the initial fluid inflow constant (B), and the spring constant (k). Various trials were conducted by varying some of these parameters and the results were recorded and plotted. It was observed that the motion of the polymer was more noisy for higher values of a and k. The variation of time periods with the changing parameters was studied numerically.

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Date submitted: 10 Sep 2010 Electronic form version 1.4