Abstract Submitted
for the SES07 Meeting of
The American Physical Society

Kinetics, Stretching and Cross-Stream Migration of Polymer Solutions in Nanoscale pores under Poiseuille Flow[1] JAIME MILLAN, MOHAMED LARADJI, Dept. of Physics, University of Memphis — Polymer solutions in nanoscale slit pores and under Poiseuille flow are systematically investigated via dissipative particle dynamics simulations. We consider the effects of molecular weight, volume fraction, pressure gradient, and Schmidt number on the velocity profiles, polymer density and conformational profiles. We found that the mean fluid velocity decreases with increasing chain length and/or polymer volume fraction. The deviation of the velocity profile from the quadratic profile is more pronounced as the polymer molecular weight or concentration is increased. The polymer chains are least stretched along the direction of the flow in the midsection of the slit. In the direction perpendicular to the flow, the polymers are more stretched in the midsection of the slit. In the case of polymer solutions with a low Schmidt number, the polymer density profile is found to be non-uniform, and migration is observed either toward the walls or toward the midsection. However, in the case of polymer solutions with high Schmidt number, a migration toward the midsection of the slit is observed.

[1]This research is supported by a grant from the Petroleum Research Fund

Mohamed Laradji
Dept. of Physics, University of Memphis

Date submitted: 17 Sep 2007 Electronic form version 1.4