

Abstract Submitted  
for the DFD06 Meeting of  
The American Physical Society

**Polymer-vortex interactions in confined flows** TODD WEISGRABER, DAVID CLAGUE, BERNI ALDER, Lawrence Livermore National Laboratory — Drag reduction and delay of transition in bounded flows by the addition of small concentration of long chain polymers is well established, yet the underlying mechanism and a predictive model still remain elusive. Experiments and simulations reveal that the vortex structures in these flows are modified by the presence of the polymer. To further understand the details of these interactions and the dynamics of the polymer microstructure in a non-turbulent flow, we investigate the influence of a single-chain polymer on the formation and distribution of vorticity in a lid-driven cavity. We incorporate a FENE polymer chain model in a lattice-Boltzmann method for the fluid and examine the effect of chain length and extensibility on the initial flow transients. The relationship between the polymer relaxation and vortex formation time scales will also be discussed.

Todd Weisgraber  
Lawrence Livermore National Laboratory

Date submitted: 04 Aug 2006

Electronic form version 1.4