Abstract Submitted
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Transverse migration of a polyelectrolyte driven by electric and pressure-driven flow fields[1] RAHUL KEKRE, TONY LADD, JASON BUTLER, University of Florida — Capillary electrophoresis experiments show that a flexible polyelectrolyte migrates under the combined action of electric and pressure-driven-flow fields [1]. When the fields act in conjunction, the polymer migrates to the center of the channel, but when the pressure gradient and external force act in opposite directions, the polymer migrates towards the boundaries. We have previously proposed that this is caused by long-range dipolar interactions between segments of the polyelectrolyte chain [2]. Due to the stretching and orientation of the chain by the local shear flow, there is a net motion transverse to the flow and field lines. Here I will describe a coarse-grained simulation of polyelectrolyte migration, including hydrodynamic interactions from the imposed flow and electric fields. The effects of the no-slip condition on the walls are included by regularized Green's functions. Our results explain the experimentally observed migration under different combinations of flow and electric field. [1] J. Zheng and E. S. Yeung. Anal. Chem., 74:4536, 2002; 75:3675, 2003. [2] O. B. Usta, J. E. Butler and A. J. C. Ladd. Phys. Rev. Lett., 98:098301, 2007.

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Tony Ladd
University of Florida

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