Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Understanding hydrodynamics in the cell at the molecular level
XIAOYU BAI, PETER WOLYNES, Rice Univ — Cellular collective motion is a result of complex coupling of nonequilibrium mechano-chemical events in the cytoskeleton, of which the underlying physics is far from completely understood. In an attempt to study the cytoskeletal dynamics, we develop analytical theories based on a coarse-grained model, Cat's Cradle. Our current work highlights how the activated events due to energy-consuming molecular motors are coupled by hydrodynamic interaction and therefore reveals the modified cytoskeletal dynamics. Within our framework, we were able to find the stability limit of the uniformly flowing phase, which is consistent with the predictions from the well-studied continuum models. In the model we accounted for the effect of shear-stretching forces on the extended structure of molecular motors. The resulting influenced stochastic properties of motor power strokes provide us with further insights into the nonequilibrium aspects of cellular dynamics.

Xiaoyu Bai
Rice Univ

Date submitted: 14 Nov 2014 Electronic form version 1.4