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Dynamics of Polymers in Colloidal Flows HSIEH CHEN, ALFREDO ALEXANDER-KATZ, Massachusetts Institute of Technology — This research is motivated by recent studies on the von Willebrand factor (vWF), a large multimeric protein that plays an essential role in the initial stages of blood clotting in blood vessels. Recent experiments substantiated the hypothesis that the vWF is activated by shear stress in blood flow that causes its shape to transform from a compact globule to an extended state [1], and biological function is obtained only in the extended state. Simple simulations (which only consider a single polymer in bulk shear flow) have successfully reproduced the observed dynamics of the vWF [2]. However, a more refined model is still demanding for the better understanding of the behaviors of this biomolecule in the physiological environments. Here we refine the existing model by adding the drifting colloids into the flows to mimic the presence of the blood cells in the bloodstream. Preliminary result shows that colloids greatly influence the dynamics of the polymers. It is observed that the average extensions of polymers along and perpendicular to the shear flow direction are both increased with the presence of the colloids.

[1] S.W. Schneider, et. al. PNAS (2007) 104 19 7899-7903
[2] A. Alexander-Katz, et. al. Phys. Rev. Lett. (2006) 97 13 138101

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