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### **Single Molecule Studies of the Effect of Flow Type on the Dynamics of Polymer Solutions**

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The dynamics of individual long chain polymers in solution depends critically on the local flow type (i.e. the relative balance between vorticity and rate of strain) even in the approximation that the flow is locally linear. Indeed, single molecule studies (including fluorescence microscopy of DNA as well as Brownian dynamics simulation) have elucidated the transition from stable extended conformation states for purely extensional flows to rotating “vane-like” motion in pure vortical flows. These studies have demonstrated most recently that *conformational fluctuations* are critical in understanding the dynamics, whereas early theoretical literature focussed on only the mean polymer conformation. The effect of long range intra-chain interactions (hydrodynamic and excluded volume) on these conformational fluctuations also appears to be critical particularly at high molecular weights. In this talk, I will review progress in this area and then ultimately focus on specific studies of the effect of flow type on (a) conformation hysteresis in the coil-stretch transition, (b) tumbling motion in vortical flows and (c) interchain interactions in non-dilute solution.