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**Mesoscopic dynamics of polymer chains in high strain rate extensional flows** DEMOSTHENES KIVOTIDES, THEO THEOFANOUS, University of California, Santa Barbara — The study of high speed aerobreakup of polymeric liquids is obstructed by the lack of standard viscoelastic constitutive laws valid for high strain rate extensional flows. In order to reliably estimate polymer induced elastic stresses in these processes, we perform Brownian dynamics calculations of a bead-spring polymer model at high Deborah numbers. The predictions of our computational chain model match experimental largest relaxation time and elastic stress levels. By kinematically prescribing the solvent flow, we study polymer response in dilute, high strain rate extensional flows typical of aerobreakup experiments clarifying the physical mechanisms of chain stretching and computing transient extensional viscosities. In the context of confined systems, we investigate the dynamical effects of topological chain entanglement.

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