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Brownian Dynamics Study on the Dynamics of Asymmetric and Symmetric Star-Branched Polymers in Dilute Solutions YONG LAK JOO, School of Chemical & Biomolecular Engineering, Cornell University, YONGMIN LEE — It has been known that the dynamical behavior of branched polymers can significantly be different from linear polymers even in dilute solutions. The goal of this investigation is to understand detailed configuration and stretching dynamics of polymers with complex branching topologies in dilute solutions under various flows. In particular, we are interested in the transient stress response and conformational hysteresis of star-branched polymers in shear and extensional flows. Using Brownian dynamics simulations of bead-spring models, systems such as dilute solutions of Y-branched and star-branched polymers under flows are investigated. Studies on polymers with asymmetric arms reveal that the initial transient response is governed by both the number of arms and the shortest arm, whereas the stress response at intermediate strains becomes dominated by the longest arm. The results obtained from stress-conformation hysteresis simulations indicate that rapid extension followed by retarded relaxation of short arms in star-branched molecules. Finally, excluded-volume interactions are incorporated through the Lennard-Jones potential, and are applied to the study of the dynamics of branched polymers under confinement.

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