Brownian Dynamics computer simulations of a bead-spring polymer model were performed in order to investigate single-chain dynamics in a semidilute solution.

In equilibrium and at small shear rates the end-to-end vector correlation function $<\mathbf{R}(0)\cdot\mathbf{R}(t)>$ exhibits double-exponential relaxation. With increasing shear rate it shows oscillatory relaxation, which hints at tumbling motion previously found in dilute solutions. The change of the relaxation mode of the end-to-end vector correlation function can be correlated with shear thinning of the semidilute solution.

A real time analysis of the instantaneous values of the radius of gyration ($R_g$), end-to-end distance ($R_e$), orientation ($\Theta$), bonding normal stress ($\sigma_{zz}^b$) and nonbonding normal stress ($\sigma_{zz}^{nb}$) reveals correlations between fluctuations of these quantities.