Nonlinear Parameter Q for Characterizing Polymer Solutions and Polymer Melts under Large Amplitude Oscillatory Shear Flow

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Recently, large amplitude oscillatory shear (LAOS) tests have been studied extensively because the deformations can be large and rapid in most processing operations. Stress curve is sinusoidal shape similar to applied strain curve under small amplitude oscillatory shear (SAOS) flow, but stress curve is not sinusoidal any more under LAOS flow. Therefore, analysis of the data obtained from LAOS tests is not straightforward compared with SAOS tests. Wilhelm and coworkers suggested using Fourier transformation to analyze the LAOS results and defined this method as FT-Rheology. Nowadays, FT-Rheology is the most common method among various methods. Since then, Hyun and Wilhelm established nonlinear parameter Q and intrinsic nonlinearity Q_0 from FT-Rheology to characterize different topologies. In this study, nonlinear parameters of polymer solutions and polymer melts were investigated under LAOS flow.