

Orientation and deformation of FENE dumbbells in a narrow channel flow using micro-macro simulation

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We investigate the behaviors of dilute polymer solution in a narrow channel using the Brownian Configuration Field method. Dilute polymer solution is modeled by a suspension of FENE dumbbells and we apply anisotropic drag and anisotropic Brownian force to the governing equation in order to consider the interaction between polymer and the wall. For accurate and stable results, we use adaptive semi-implicit predictor-corrector method and DEVSS-G/DG scheme. As a result, we observe the tumbling phenomena of individual dumbbells near the wall under very strong anisotropic drag and present their tumbling mechanism. Also the effects of flow conditions and polymer properties on the orientation and the deformation of FENE dumbbells are presented.