

Investigation of structural parameters of dilute polymer solutions using velocity measurements

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The most widely adopted constitutive model of viscoelastic flows based on the kinetic theory is the FENE(FinitelyExtensible Nonlinear Elastic) model. This model represents a polymer molecule by a dumbbell which consists of two beads connected by a spring. The direction and elongation of the spring are described by the Fokker-Planck equation. The two important parameters in the Fokker-Planck equation, which represent the relaxation time and the maximum extensibility of the dumbbell, determine the viscoelasticity of flows and affect the velocity fields. In the present work, we devise a method of estimating these two parameters using velocity measurements. The relevant inverse problem is solved by converting it to a minimization problem of a performance function employing a conjugate gradient method. The present scheme is shown to estimate these structural parameters even with noisy velocity measurements.