

Aspects of computing with high viscoelasticity

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In order to deal with practical polymer processing, it is necessary to do computations on highly nonlinear viscoelastic materials in unsteady, non-isothermal flow. Sometimes phase and structure changes are involved. The nature of the task is outlined and the forms of the equations and boundary/initial conditions needed to describe the polymer behaviour are indicated. Generally, one runs into computational instabilities on which considerable effort and ingenuity have been expended. Various efforts to defeat these so-called High Weissenberg Number Problems are described and some of their advantages and drawbacks are discussed. While considerable progress has been made, there are still some areas - for example, the accurate computation of transient flows where further efforts and ideas are needed. Some recent work on this problem is noted.