

Abstract Submitted
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Is there a Relationship between the Elongational Viscosity and the First Normal Stress Difference in Polymer Solutions? STEPHAN GIER, ANDREAS ZELL, Universität des Saarlandes, SALIMA RAFAI, Laboratoire de Spectrometrie Physique, CHRISTIAN WAGNER, Universität des Saarlandes — We investigate polymer solutions in shear and elongational flow. Shear flow is created in a cone-plate-geometry of a commercial rheometer. The capillary thinning of a filament of polymer solution in the Capillary Breakup Extensional Rheometer (CaBER) serves as an elongational flow. We compare the relaxation time and the elongational viscosity measured in the CaBER with the first normal stress difference and the relaxation time from the rheometer measurements. All these four quantities depend on different fluid parameters - the viscosity of the polymer solution, the polymer concentration within the solution, and the molecular weight of the polymers - and on the shear rate (in the shear flow measurements). Nevertheless, we found that the first normal stress coefficient depends quadratically on the CaBER relaxation time. A simple model is presented that explains this relation on a phenomenological level.

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