

KINETIC PROCESSES IN RHEOLOGY: DYNAMICS OF ASSOCIATIVE POLYMERS AND VISCOELASTIC SURFACTANTS

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ABSTRACT

Solutions of viscoelastic surfactants formed by wormlike micelles exhibit a very interesting rheological behaviour, which is similar to that observed in associative polymers. The dynamics of both systems can be explained as a kinetic process of breaking-reformation of the microstructure coupled to the rheology of the fluid. This coupling causes very interesting rheological phenomena, whose modelling by constitutive equations is quite a challenge.

Here, the viscoelastic behaviour of associative polymers is analysed with a multi-mode rheological equation of state, which couples a kinetic equation that accounts for the structural changes due to the flow with an upper-convected Maxwell equation. In addition, it is shown that a single-mode reduction of the model accounts for the basic rheological behaviour of wormlike micellar systems.