Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Migration of rigid particles in two-phase shear flow of viscoelastic fluids PATRICK ANDERSON, NICK JAENSSON, MARTIEN HULSEN, Eindhoven Universiy of Technology — In the Stokes regime, non-Brownian, rigid particles in a shear flow will not migrate across streamlines if the fluid is Newtonian. In viscoelastic fluids, however, particles will migrate across streamlines away from areas of higher elastic stresses, e.g. towards the outer cylinder in a wide-gap Couette flow. This migration is believed to be due to a difference in normal stresses. We simulate the two-phase case where this difference in normal stresses is not due to the flow field, but rather due to the properties of the fluids. We apply the diffuse-interface model for the interface between the two fluids, which can naturally handle a changing topology of the interface, e.g. during particle adsorption. Furthermore, the diffuse-interface model includes an accurate description of surface tension and can be used for a moving contact line. A sharp interface is assumed between the particles and the fluids. Initially, a particle is placed close to an interface of two fluids with different viscoelastic properties in a shear flow. We show that based on the properties of the fluids and the interfacial tension, four regimes can be defined: 1) migration away from the interface, 2) halted migration towards the interface, 3) adsorption of the particle at the interface and 4) penetration of the particle into the other fluid. This research forms part of the research programme of the Dutch Polymer Institute (DPI), Project #746.

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Date submitted: 31 Jul 2015 Electronic form version 1.4