Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Studies of Surfactant Effects in the Breakup and Coalescence of Viscous Drops L. GARY LEAL, BING DAI, ADAM HSU, YOSANG YOON, Dept. of Chemical Engr, UCSB — In the present study, we utilize boundary integral solutions in an attempt to understand recent "unexpected" experimental results for surfactant effects on the breakup and coalescence of viscous drops in low Reynolds number flow. The experiments were carried out using low molecular weight polymers that acted as viscous Newtonian fluids, with block copolymers that act as insoluble surfactants. Model parameters were selected, so far as possible, to correspond to the experimental systems. For drop breakup, we explore the non-uniformity of the surfactant concentration on the interface, which does not always increase with increase of the shear rate, as expected. For coalescence, we examine a number of unexplained results including: the details of the inhibition of film rupture due to Marangoni effects; the fact that the scaling with capillary number remains the same as for a clean interface system; and the discontinuous transition in the coalescence process that occurs for low surface coverage as the capillary number is increased.

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Date submitted: 05 Aug 2006 Electronic form version 1.4