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Coalescence of surfactant covered drops SUMEET THETE, KRISHNARAJ SAMBATH, OSMAN BASARAN, School of Chemical Engineering, Purdue University, West Lafayette, IN-47906 — Drop coalescence plays a central role in industry, e.g. emulsions, sintering, and inkjets, and in nature, e.g. raindrop growth. During coalescence, two drops touch and merge as a liquid neck connecting them grows from microscopic to macroscopic scales. In applications, the drops, while still Newtonian, may be covered with surfactant. Here, we use simulation to analyze the simplest of such problems: two identical drops covered with a monolayer of insoluble surfactant merging in air. The dynamics is analyzed by using as guide the recent work of Paulsen et. al. (2012) who revolutionized the understanding of the coalescence singularity for drops with clean interfaces by demonstrating that the asymptotic regime of coalescence must always involve a balance between inertial, viscous, and capillary forces. These authors summarized their findings by a phase diagram which showed that as coalescence proceeds, the dynamics transitions from this early inertially limited viscous regime to a late time inertial (Stokes) regime when drop viscosity is low (high). Among other things, the talk will highlight how the presence of surfactant modifies the phase diagram obtained by Paulsen et al.

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