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The effect of interfacial slip on the drainage time to coalescence between two droplets L. GARY LEAL, KOSTAS TSIGLIFIS, ARUN RAMACHANDRAN, ANSHUMAN ROY, University of California, Santa Barbara — A fundamental question that arises in the coalescence of two drops in a flow is the dependence of the drainage time t_d prior to film rupture on the capillary number Ca and the dimensionless Hamaker constant, which is inversely proportional to the square of the drop radius, R^{-2}. Prior investigations from our group have shown that predictions of this relationship based on both scaling theory and numerical simulations deviate qualitatively from experimental data. We believe that a possible explanation for these discrepancies is a breakdown of the continuum flow model for the extremely thin films that are realized prior to film rupture. Such a breakdown would most likely first manifest itself as a violation of the no-slip condition at fluid interfaces. In this work, we examine the effect of interfacial slip on the dependence of the drainage time with capillary number for different λ via boundary integral simulations. Interfacial slip is modeled via the Navier-slip condition, and the slip parameter employed in the simulations is predicted using the work of Goveas and Frederickson [*Eur. Phys. J. B* **2**, 79–92 (1998)]. The agreement with the scaling exponents of t_d versus Ca and$R$ is improved, but the absolute values of the drainage times are lower than the experimental values. Possible reasons for these deviations are explored.

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