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**Coalescence of surfactant-laden drops in liquid-liquid emulsions**
VISHRUT GARG, Air Products and Chemicals, Inc., OSMAN BASARAN, Purdue University — Determining the timescale over which liquid-liquid emulsions separate into their constituents is crucial for many processes, e.g. separating crude oil from brine. This timescale depends on the dynamics of collision and coalescence of liquid drops immersed in a second liquid which can be significantly altered by the presence of surfactants at the liquid-liquid interface. We simulate the approach, collision, and eventual coalescence of two drops immersed in an ambient liquid in the presence of insoluble surfactants where both liquids are incompressible Newtonian fluids. The governing equations are augmented to account for long range van der Waals interactions that become significant as the separation between the drops falls below a few hundred nanometers and solved using a Galerkin finite element based algorithm. In contrast to drops with clean interfaces which coalesce during their first approach, surfactant laden drops are seen to rebound on first approach before coalescing on their subsequent approach. This rebound results in increased drainage times. We examine the physics underlying drop rebound in the presence of surfactants.

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