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Interactions of Surfactant-covered Spherical Drops in Gravity and Shear Flow MICHAEL ROTHER, University of Minnesota-Duluth, ALEXANDER ZINCHENKO, ROBERT DAVIS, University of Colorado at Boulder — Collision efficiencies are calculated by a trajectory analysis for two contaminated spherical drops in buoyancy and shear flow at low Reynolds number with arbitrary surfactant surface coverage. The full time-dependent convective-diffusion equation for the insoluble surfactant is coupled with the solution of the hydrodynamic problem. The method includes high-order expansion in spherical harmonics and implicit time-marching for the surfactant, and Lamb's series with biconjugate-gradient iterations for the velocity field, to obtain solutions to near-contact (0.0001a) at arbitrary Peclet (Pe) and Marangoni numbers (Ma). At small Pe or large Ma, the deviation in surfactant coverage is small, and the results for the incompressible surfactant model are recovered. For large Pe or small Ma, however, the collision efficiency approaches the clean interface value, with generally intermediate results at other values of the governing parameters. The possibility of significant surfactant redistribution in the region of close approach under conditions when the surfactant concentration remains nearly uniform when the drops are well separated is also considered.

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