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**Drops and emulsions with complex interfaces** PHILIPP ERNI, Dept. of Mechanical Engineering, MIT, Cambridge MA, ERICH J. WINDHAB, PETER FISCHER, ETH Zurich, 8092 Zurich, Switzerland — We study the behavior of emulsion drops in external flow fields, focusing on recent experimental work involving liquid interfaces covered with surface-active species, in particular adsorbed proteins and particles. Three different length scales are considered: (i) the rheology of complex interfaces is discussed for adsorbed polyelectrolyte surfactants with different molecular structure (compact and globular vs. random coil); (ii) the flow of single drops with macromolecular adsorption layers is studied in optical flow cells; (iii) dilute emulsions of drops are investigated using rheo-small angle light scattering (rheo-SALS). We discuss the results in the context of emulsion and drop models accounting for interfacial viscoelasticity, as well as with capsule suspension models for the case of rigid interfacial layers. Drops stabilized by adsorbed particles or globular proteins can be understood as capsules surrounded by a soft shell; their behavior on the single drop level is in many ways reminiscent of phenomena observed with red blood cells or vesicles, including non-linear drop shape fluctuations under creeping flow conditions. References: [1] Fischer P, Erni P. Curr Opin Colloid Interface Sci (2007, accepted) [2] Erni P et al., Appl Phys Lett 87, 244104 (2007)

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