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Flow fields in soap films: effects of surface viscosity and film thickness VIKRAM PRASAD, ERIC R. WEEKS, Emory University — A soap film is a thin fluid layer (10 nm to 10 microns thick) separated from bulk air phases above and below it by two surfactant monolayers. We measure the flow field in these films by two-particle microrheology, which looks at the correlated Brownian motion of pairs of embedded tracer particles separated by a distance R. In thin soap films with the thickness comparable to the particle size, and with mobile surfactant interfacial layers, this flow field is long ranged. On the other hand, the flow field in a 3D fluid is known to decay as 1/R. We vary the thickness of the soap film, the mobility (surface viscosity) of the interface and the size of the polystyrene probe particles to quantify the transition of the hydrodynamics of the film from quasi-2D to 3D-like behavior.

Vikram Prasad
Emory University

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