Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Effective dilution of surfactants due to thinning of the soap film. AAKASH SANE, SHREYAS MANDRE, ILDOO KIM, Brown University — A flowing soap film is a system whose hydrodynamic properties can be affected by its thickness. Despite abundant experiments performed using soap films, few have examined the dependence of its physical as well as chemical properties with respect to its thickness. We investigate one such property - surface tension of the flowing film and delineate its dependence on the concentration of the soap solution and flow rate per unit width i.e. thickness of the soap film. Using our proposed method to measure the average surface tension in-situ over the whole soap film, we show that the surface tension increases by reducing the thickness of the film and by reducing the concentration of the soap solution. Our data suggests that thinning of the soap film is effectively diluting the solution. Thinning increases the adsorption of surfactants to the surfaces, but it decreases the total number of molecules per unit area. Our work brings new insight into the physics of soap films and we believe that this effective dilution due to thinning is a signature of the flowing soap films, whose surface concentration of surfactants is affected by the thickness.

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Date submitted: 01 Aug 2017 Electronic form version 1.4