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Elastocapillarity and the curling of fibers ANUPAM PANDEY, Virginia Tech (Poly) Inst, SUZIE PROTIERE, UPMC Université Paris 06, UMR 7190, Institut Jean le Rond d’Alembert, DOUGLAS HOLMES, Virginia Tech (Poly) Inst — Coalescence of paintbrush bristles removed from a bath of fluid is the result of competing elastic and surface energies. The lengthscale that emerges out of this energy balance is called the “elastocapillary” lengthscale. This phenomenon has been well studied both experimentally and theoretically at the desktop scale as well as microscale. But in many natural and synthetic systems, the fluid between the flexible fibers can swell the material and causes the fibers to curl. A natural example is human hair, which swells in humid conditions, dilating and becoming frizzy. In this presentation, we demonstrate experimental results on this coupled “elastocapillary-elastoswelling” system. Specifically, we identify two distinct regimes dominated by capillarity and swellability, and the transition between these two regimes is governed by the “elastoswelling” lengthscale. We also show that in the swelling dominated regime a small fluid droplet is being carried upward by the curling fibers that mimic a pipetting mechanism.

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