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Bringing elasticity to classical fluid problems

Despite their common origin, fluid and solid mechanics have grown into separate fields which often do not interact. Yet, in many situations ranging from the vibrations of our vehicles to the pulsatile flow in our arteries, fluid and solid movements are intrinsically linked. This connection is particularly salient in biological systems which are often composed of fluids enclosed by soft solid-like materials. In this talk, I will show the surprising and insightful results we obtained by introducing elasticity to two classical fluid problems: the Rayleigh-Taylor instability of thin films and the impact of drops on solid surfaces. I will first describe the formation of high aspect ratio elastic patterns, or hairs, through the amplification of the Rayleigh-Taylor instability in a solidifying melt. Then, I will reveal how elastic capsules deform and eventually burst upon high speed impact on rigid walls.