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The dynamics of drops coating the underside of a flexible wall[1]
CRASTER RICHARD, ALEX WRAY, DEMETRIOS PAPAGEORGIOU, OMAR MATAR, Imperial College London — Lister et al., 2009, showed that a thin fluid coating the underside of a ceiling (a model which extends in particular the works of Hammond, 1983, and Lister et al., 2005) can give rise to pendent drops. If these are fixed in place by boundary conditions, they drain to give drops of constant pressure surrounded by annular trenches. These authors also showed that, on larger domains starting from an initial perturbation, these drops will undergo a self-induced quasi-steady translation. This is driven by the release of gravitational potential energy as the fluid in the film falls into the drop. The speed and growth of these drops is accessible to analytical computation by the self-similar study of the thin trenches surrounding them, and matching to far external conditions. The subsequent dynamics are intricate, allowing for coalescence (not seen in 1 dimension) as well as complex drop-drop interactions. We extend this model to allow for the ceiling to be a flexible substrate, and also to account for inertial effects in the drops. We then investigate the effect this has on the dynamics of the drops.

[1]EPSRC DTA

Omar Matar
Imperial College London

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