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Fluid flow and the bending, buckling and wrinkling of floating elastica FINN BOX, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, UK., JEROME NEUFELD, BP Institute, University of Cambridge, UK. — Bending, buckling and wrinkling of floating elastic sheets may be induced by localised viscous flows leading to a complex interplay between flow and deformation. Here we present an experimental investigation illuminating the rich behaviour that arrises due to the coupling between deformation and viscous flow. An understanding of this fluid-structure interaction is applicable over a wide-range of length-scales, from the loading of the Indian subcontient by the Tibetan plateau to the deformation of nanoscale elastic sheets by fluid deposition. We explore the limits of small and large deformations through a range of fluid fluxes and by altering the ratio of spreading to ambient fluid densities, in order to characterise the bending-dominated and tension-dominated spreading regimes. We identify regimes for which the fluid motion is similar to that of a gravity current spreading over a rigid surface and for which the propagation of the fluid is dominated by the elastic deformation of the sheet. The coupling between flow and tension-induced wrinkling of the sheet, which occurs for large deformations, is also explored.

Finn Box
University of Cambridge

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