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Liquid Jet Interaction with an Elastic Cell Wall MAZIYAR JALAAL, MICHAEL GOMEZ, RAYMOND GOLDSTEIN, University of Cambridge, DEPARTMENT OF APPLIED MATHEMATICS AND THEORETICAL PHYSICS TEAM — Recent results (Jalaal et al. Phys. Rev. Lett. 125, 028102) have elucidated how marine dinoflagellates respond to fluid and mechanical stresses by emitting flashes of bioluminescence. Those stresses deform the cell wall on scales of 1-10 microns, with forces estimated in the nanonewton range. As a first step toward understanding the mechanics of these processes, we study here the elastohydrodynamic problem of a liquid jet interacting with a deformable cell wall; the latter described within thin-shell theory. Abstracting the jet as a point force, we solve for the flow and deformation of the shell, arising from a nearby stokeslet. The results are supplemented with finite-element calculations that begin to probe beyond the Stokes regime.

Maziyar Jalaal
University of Cambridge

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