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Dynamics of liquid lenses RICHARD CRASTER, OMAR MATAR, Imperial College London — The dynamics of a lens of one liquid moving on the surface of another liquid is examined using Lubrication theory. A coupled system of equations for the air-liquid and liquid-liquid interfaces is derived. For highly viscous lenses, extensional stresses are promoted and an additional equation for the lens velocity is derived. The potential singularity at the three-phase line is alleviated by a microscopic precursor layer of the spreading fluid assumed to be present ahead of the macroscopic lens. The results of our numerical simulations show that, for weak gravitational forces, the shape of the lens at equilibrium depends solely on the surface tension ratio for sufficiently deep substrate thicknesses. For thin substrates, the underlying liquid film deforms severely near the point of deposition exhibiting flattening and dimpling.

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