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Out-of-contact elastohydrodynamic deformation due to lubrication forces.[1] YUMO WANG, CHARLES DHONG, JOELLE FRECHETTE, Johns Hopkins University — We characterize the spatiotemporal deformation of an elastic film during the radial drainage of fluid from a narrowing gap. Elastic deformation of the film takes the form of a dimple and prevents full contact to be reached. With thinner elastic film the stress becomes increasingly supported by the underlying rigid substrate, the dimple formation is suppressed, which allows the surfaces to reach full contact. We highlight the lag due to viscoelasticity on the surface profiles, and that for a given fluid film thickness deformation leads to stronger hydrodynamic forces than for rigid surfaces.

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