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Evolution of interface deformations for a drop impacting a viscous thin film[1] SRINATH LAKSHMAN, WALTER TEWES, JACCO SNOEIJER, DETLEF LOHSE, University of Twente — Surfaces coated with thin and viscous liquids provide hydrodynamic lubrication desired in many industrial and technological applications. However, these liquid films deform when subject to external forces eg. during drop impact, which could deteriorate the surface coating. In the present work, we perform experiments of a water drop impacting a thin silicone oil film in an ambient air environment. In the considered low impact velocity regime, the water droplet rebounds from the coated surface due to air cushioning between the drop and the silicone oil surface. In order to better understand the coupling between the deformation of the water-air and the oil-air interface, we investigate a) the narrow air layer profiles sandwiched between the impacting drop and the underlying thin film during the impact and b) the thin film deformations immediately after the rebound of the drop. The air layer profiles and thin film deformations are measured independently using color interferometry and digital holographic microscopy techniques, respectively. We discuss the influence of film thickness, film viscosity, and drop impact velocity on the obtained air layer profiles and thin film deformations.

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