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Dynamics of a bubble bouncing at a compound interface JIE FENG, Princeton University, METIN MURADOGLU, Koc University, HOWARD A. STONE, Princeton University — Bubbly flow is extensively involved in a wide range of technological applications, which generate a great demand for understanding of bubble physics. The collision, bouncing and coalescence of moving bubbles with liquid/gas and liquid/solid interfaces, as the first stage for the formation of foams and flotation aggregates, have been the subject of many studies, but there are still unanswered questions related to how the properties of the interface influence the dynamics. For example, Zawala et al. 2013 have tried to investigate how the kinetic energy of the bubble affects the liquid film drainage during the collision with an air-water interface. Inspired by Feng et al. 2014, we study the dynamics of an air bubble bouncing at a liquid/liquid/gas interface, in which a thin layer of oil is put on top of the water. The presence of the oil layer changes the interfacial properties and thus the entire process. Combined with direct numerical simulations, extensive experiments were carried out to investigate the effects of the oil layer thickness, oil viscosity, bubble size and initial impact velocity on the bouncing of the bubble at the compound interface. In addition, a mass-spring model is proposed to describe the bubble dynamics and interactions with the oil layer.

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