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3D numerical simulations of oblique droplet impact onto a deep liquid pool[1] HANNEKE GELDERBLOM, STEN A REIJERS, MARISE GIELEN, PASCAL SLEUTEL, DETLEF LOHSE, University of Twente, Netherlands, ZHIHUA XIE, Cardiff University, CHRISTOPHER C. PAIN, OMAR K. MATAR, Imperial College London — We study the fluid dynamics of three-dimensional oblique droplet impact, which results in phenomena that include splashing and cavity formation. An adaptive, unstructured mesh modelling framework is employed here, which can modify and adapt unstructured meshes to better represent the underlying physics of droplet dynamics, and reduce computational effort without sacrificing accuracy. The numerical framework consists of a mixed control-volume and finite-element formulation, a volume-of-fluid-type method for the interface-capturing based on a compressive control-volume advection method. The framework also features second-order finite-element methods, and a force-balanced algorithm for the surface tension implementation, minimising the spurious velocities often found in many simulations involving capillary-driven flows. The numerical results generated using this framework are compared with high-speed images of the interfacial shapes of the deformed droplet, and the cavity formed upon impact, yielding good agreement.

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