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Moving and deforming a liquid drop by pulsed laser irradiation
ALEXANDER L. KLEIN, CLAAS WILLEM VISSER, Physics of Fluids, Faculty of Science & Technology, University of Twente, The Netherlands, HENRI LHUISSIER, Matiere et Systemes Complexes, Université Paris Diderot, France, EMMANUEL VILLERMAUX, Aix-Marseille Université, IRPHE, France, CHAO SUN, DETLEF LOHSE, HANNEKE GELDERBLOM, Physics of Fluids, Faculty of Science & Technology, University of Twente, The Netherlands — The impact of a focused laser pulse onto a liquid drop can be so violent that the drop strongly deforms and eventually explodes. We studied the drop dynamics that results from this laser impact experimentally, in order to understand the time evolution of the drop and find the underlying driving mechanism. The high reproducibility of the dynamics allowed us to use stroboscopic illumination with short, ns exposure times. Combining this technique with high-speed imaging we captured key details of the laser impact and drop deformation. The laser impact ablates the front the drop while the remainder of the drop acquires a velocity of several m/s. The drop expands radially into a disk-like shape with a velocity of the same order of magnitude, before instabilities develop and the drop fragments. A parameter study of the time-resolved drop shape and velocity as a function of the laser energy is presented.

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