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Simultaneous LIF/shadowgraphy visualization of droplet breakup in high-speed flows.[1] LUC BIASIORI-POULANGES, HAZEM EL-RABII, Institut Pprime (CNRS) — Aerobreakup of drops in the flow behind shock waves is an important phenomenology that plays a fundamental role in a wide range of technical applications. A survey of the numerous earlier studies shows that there exists a rich variety of droplet breakup regimes. Among these breakup regimes, the experimental study of the stripping regime is particularly challenging owing to the presence of a dense mist surrounding the fragmenting drop. This study investigates the application of laser-induced fluorescence (LIF) in combination with a shadowgraph technique to image water drop disintegration behind shock waves. The experiments were conducted in a shock tube facility, for low to moderate Weber numbers in subsonic and supersonic flows. To discriminate the drop from the surrounding gas, the water was tagged non-intrusively by mixing it with a water-soluble fluorescent dye. The simultaneous application of both diagnostics provides thus a means to decouple the evolution of the deforming drop from the mist. Furthermore, in the case of supersonic flows, the knowledge of the liquid core location, as well as the position and the shape of the detached and recompression shocks, enables to determine the sonic lines and the size of the recirculation zone behind the droplet.

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