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Experimental investigation of the breakup of a round liquid jet in a shock-induced crossflow JOSEPH OLLES, DANIEL GUILDENBECHER, JUSTIN WAGNER, EDWARD DEMAURO, PAUL FARIAS, THOMAS GRASSER, Sandia National Laboratories, PAUL SOJKA, Purdue University — The breakup of a round water jet due to a step change in the convective air velocity following a 1D air-shock was experimentally investigated. Variations of this experiment have been conducted in the past, however here quantitative results on the breakup sizes and trajectories are shown. A shock tube was utilized to create the jet breakup, and the primary shape of the liquid and secondary droplet sizes were recorded optically. Through the use of digital in-line holography (DIH), the sizes, 3D position, and 3C velocities of secondary droplets were measured at kHz rates. Care was taken to ensure that the jet was kept round throughout the shock tube test section (absent of PlateauRayleigh instability). While the liquid jet geometry and velocity was kept constant, various gas-phase velocities allowed for the investigation of multiple breakup morphologies, as a function of the crossflow Weber number. The typical breakup regimes are seen; bag, multimode, and sheet-thinning. With high temporal and spatial resolution, interfacial and liquid column instabilities are seen in the jet breakup.

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