

Abstract Submitted
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Electrospray Droplet Structures Imaged Using Digital Holographic PIV ALEXANDRE DE CHAUMONT QUITRY, JEFFREY GUASTO, KENNETH BREUER, Brown University — We present holographic measurements of an electrospray, illustrating the three-dimensional spatial structure of droplets after jet breakup including droplet divergence. A conducting fluid (doped isopropanol) subjected to strong electric fields on the order of 300 kV m^{-1} forms a Taylor cone, which emits a jet from the cone apex (tip streaming). Surface tension forces neck the jet into $2 \mu\text{m}$ diameter droplets, which subsequently diverge into a complex spray due to an instability involving Coulombic repulsion forces between the like-charged droplets. We use digital in-line holography with dual, pulsed Nd:YAG lasers to illuminate the droplet spray near the divergence region. Droplets are detected by reconstructing the three-dimensional intensity field from the recorded holograms. Due to the high-speed of the droplets (approximately 100 m/s), a unique imaging system is employed, which is described in the presentation.

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