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Atomization patterns of liquid sheets formed by two impinging jets[1] DONG-JUN MA, XIAO-DONG CHEN, VIGOR YANG, School of Aerospace Engineering, Georgia Institute of Technology — High fidelity numerical simulations have been performed to study the atomization patterns and breakup characteristics of liquid sheets formed by two impinging jets. A fully three-dimensional Volume-of-Fluid method with adaptive mesh refinement (AMR) based on octree-mesh is used to simulate the primary atomization. The start of the art visualization techniques with volume rending were also used to highlight the breakup characteristics. The oblique collision of two cylindrical laminar jets leads to the liquid owing outward from the impact point, creating a thin sheet which lies in a plane perpendicular to the plane containing the two jets and disintegrates into ligaments or droplets. The breakup of the sheet is dominant by the viscosity and surface tension effects (Reynolds and Webber number). The periodic waves from the point of impingement were apparent on the surface of the sheet. The circumferentially space drops were shed from the periphery of the sheet, as well as the ligaments were fragmented from the leading edge of the sheet and then broke into droplets following the Rayleigh mechanism. The impact waves caused early breakdown of the sheet downstream of the impingement point, whereas waves amplified by aerodynamic stresses controlled the breakdown of the rest of the sheet and the ligaments.

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