

Quantitative Characterization of Single Orifice Hydraulic Flat Spray Nozzle

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Abstract : The single orifice hydraulic flat spray nozzle was evaluated with two global imaging techniques to characterize various aspects of the resulting spray. The two techniques were high resolution flow visualization and Particle Image Velocimetry (PIV). A CCD camera with 29 million pixels was used to capture shadowgraph images to realize ligament formation and collapse as well as droplet interaction. Quantitative analysis was performed to give the sizing information of the droplets and ligaments. This camera was then applied with a PIV system to evaluate the overall velocity field of the spray, from nozzle exit to droplet discharge. PIV images were further post-processed to determine the inclusion angle of the spray. The results from those investigations provided significant quantitative understanding of the spray structure. Based on the quantitative results, detailed understanding of the spray behavior was achieved.

Keywords : spray, flow visualization, PIV, shadowgraph, quantitative sizing, velocity field

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