

Abstract Submitted
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Swirl Optimization to Maximize Spray Angle from a Coaxial Airblast Atomizer¹ SCOTT A. ZMUDA, TIMOTHY B. MORGAN, JULIE K. BOTHELL, THEODORE J. HEINDEL, Iowa State University, EXPERIMENTAL MULTIPHASE FLOW LAB TEAM — Liquid sprays play a key role in many engineering processes (e.g., food processing, coating and painting, 3D printing, fire suppression, combustion systems, etc.). One method of forming a spray is through a coaxial airblast atomizer in which a liquid stream is surrounded by a gas jet. Adding swirl to the gas jet can modify the resulting spray angle. This study completes a parametric study over a range of gas and liquid flow rates, momentum ratios, and swirl percentages, to identify those conditions that maximize spray angle. The spray angle is determined by back-illuminating the spray with an LED light panel to form a shadow of the resulting spray. A high-speed camera is then used to capture a series of successive images. Image analysis is then used to determine an average spray angle. It is shown that the swirl percentage for the maximum spray angle is a function of the flow conditions.

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