

Spray Structure of an Elliptical Effervescent Atomizer

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Abstract - The spray structure of an effervescent atomizer with an elliptical orifice is studied using the high-speed shadowgraphy technique. The major to minor axis ratio of the ellipse is 3. The effect of gas to liquid ratios (GLR) in the range of 0.55- 2.55 % on the spray angle is analyzed. The water flow rate was constant for all the tests, while the airflow rate varied. Two imaging views of minor and major axes were captured for each test condition. This study shows that an increase in the gas flowrate results in an increase in the spray angle from both imaging views. It was shown that the spray angle from the minor view is wider than that of the major view, and the difference magnifies by increasing the GLR.

Keywords: Elliptical effervescent atomizer; Outside-in gas injection; Two-phase flow; Spray angle; Gas to liquid ratio; High-speed imaging.