

## **The Influence of Atomizer Geometry on Effervescent Atomization**

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### **Abstract**

After an extensive literature review of the current state of this technology, an adjustable geometry effervescent atomizer was designed, built and studied at the Cardiff School of Engineering. Water and air were used as the operating fluids. The sprays produced by the atomizer were characterized using a Phase Doppler Anemometry (PDA) system which allowed for simultaneous real-time droplet size and velocity data to be obtained. High quality data was achieved, with data rates over 10 kHz and validation rates over 90 % in 2-D PDA mode in the high density sprays. A PDA probe designed for dense spray applications was utilized. A number of important operating parameters identified during the literature review phase could be altered on the atomizer, and their effects on fuel spray quality investigated. The operating parameters investigated in this manner included a number of operating parameters, geometric parameters as well as fluid viscosity. This paper discusses and analyzes the influence of geometric parameters on the quality of atomization. Geometric parameters investigated include exit orifice diameter, nozzle length-to-diameter ratio, mixing chamber diameter, mixing length and air injection geometry. Comparisons are made with previous studies performed using earlier versions of the hardware or alternative sampling techniques. Ongoing work will assess and optimize the performance of the atomizer using simulated biofuels mixtures – these will be presented in future publications.

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