

Experimental Study of an Internally Mixed Liquid Atomizer for an Air-breathing Engine Application

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Abstract

This paper presents experimental results on the performance of a newly designed internally mixing atomizer. This kind of atomizer can find applications in air breathing engines such as ram jet and scramjet engines in future, as it could produce spray with finer droplet sizes at lower injection pressure. This internally-mixed twin-fluid atomizer is characterized in terms of average droplet diameter (SMD), droplet size distribution and spray cone angle for a wide range of gas-liquid ratio (GLR) and injection pressure. The droplets size was measured using Malvern spray analyzer which indicates that there is a decrease in SMD with GLR. Besides this, there is a reduction in average droplet size with the variation of radial distance about the nozzle axis and this difference becomes high for low GLR values. The spray half cone angles are found to be in the range of 7.4-10.8°, which matches well with reported data available in literature. The cone angle was observed to increase slightly with GLR that may be due to increased turbulence level inside the mixing chamber. These studies are expected to aid in the development of atomizers for air-breathing engines.

Key words: SMD; GLR; Twin Fluid Atomizer

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