

Primary Atomization in Water and Kerosene Liquid Sheets At High Pressure

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Abstract

In this research, the primary atomization of a liquid sheet generated by a planar air blast atomizer was analyzed experimentally. In order to approach the operating conditions of a turbine engine, the airflow pressure was increased from an atmospheric magnitude to 11 bars absolute pressure. Furthermore, by increasing the air mass flow rate the air velocity was kept constant, for each pressure value. Its magnitude went from 20 to 70 m/s. Finally, water and kerosene Jet A1 were injected at a velocity of 1 and 2 m/s. The experimental techniques included Oscillometry Laser, LDV and flow visualization, via a fast camera, with the corresponding post-image processing. The results presented in this manuscript referred to the global oscillation frequency and the longitudinal ligaments average diameter and length. Empirical formulations were determined to express these parameters, as a function of non-dimensional ratios.

Key words: Primary Atomization, High Pressure Testing, Airblast Atomizer, Liquid Sheet, Image Treatment

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