ICLASS 2009, 11th Triennial International Annual Conference on Liquid Atomization and Spray Systems, Vail, Colorado USA, July 2009

Behaviour of Dense, Industrial Sprays: A Comparative Assessment under High Air Density Conditions

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Abstract

This paper provides a comparative assessment of conical pressure-swirl, elliptical fan and pre-filming airblast atomizers under realistic, industrially relevant operational conditions, namely at liquid flow rates and ambient air pressures of up to ~75 g/s and 14 bar. Mie scattering based laser sheet imaging and phase Doppler interferometry were employed to facilitate the experimental data acquisition on water and kerosene test fluids. Elliptical fan sprays were observed to perform better than the conical pressure-swirl whilst being broadly comparable with the prefilming airblast from spray structure standpoint.

Key words: Structure of high-throughput industrial sprays, comparative spray behaviour under high air densities, measurements in dense gas turbine sprays.