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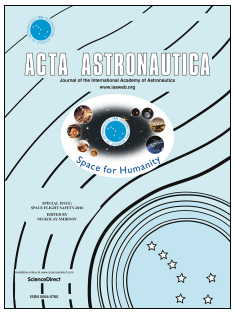

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Effects of Gas Liquid Ratio on the Atomization Characteristics of Gas-Liquid Swirl Coaxial Injectors

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Abstract

To understand the atomization characteristics and atomization mechanism of the gas-liquid swirl coaxial (GLSC) injector, a back-lighting photography technique has been employed to capture the instantaneous spray images with a high speed camera. The diameter and velocity of the droplets in the spray have been characterized with a Dantec Phase Doppler Anemometry (PDA) system. The effects of gas liquid ratio (GLR) on the spray pattern, Sauter mean diameter (SMD), diameter-velocity distribution and mass flow rate distribution were analyzed and discussed. The results show that the atomization of the GLSC injector is dominated by the film breakup when the GLR is small, and violent gas-liquid interaction when the GLR is large enough. The film breakup dominated spray can be divided into gas acceleration region and film breakup region while the violent gas-liquid interaction dominated spray can be divided into the gas acceleration region, violent gas-liquid interaction region and big droplets breakup region. The atomization characteristics of the GLSC injector is significantly influenced by the GLR. From the point of atomization performance, the increase of GLR has positive effects. It decreases the global Sauter mean diameter (GSMD) and varies the SMD distribution from a hollow cone

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