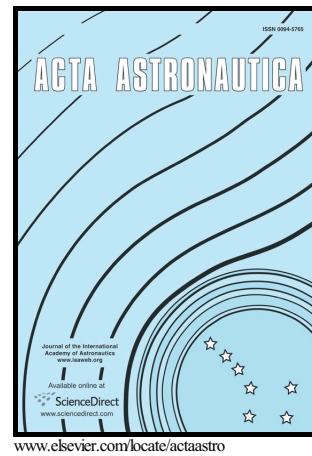


Author's Accepted Manuscript

Effects of Self-pulsation on the Spray Characteristics of Gas-Liquid Swirl Coaxial Injector

Zhongtao Kang, Qinglian Li, Peng Cheng, Xinqiao Zhang, Zhen-guo Wang



PII: S0094-5765(15)30095-3
DOI: <http://dx.doi.org/10.1016/j.actaastro.2016.05.038>
Reference: AA5849

To appear in: *Acta Astronautica*

Received date: 16 September 2015
Revised date: 4 May 2016
Accepted date: 30 May 2016

Cite this article as: Zhongtao Kang, Qinglian Li, Peng Cheng, Xinqiao Zhang and Zhen-guo Wang, Effects of Self-pulsation on the Spray Characteristics of Gas-Liquid Swirl Coaxial Injector, *Acta Astronautica* <http://dx.doi.org/10.1016/j.actaastro.2016.05.038>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and a review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Effects of Self-pulsation on the Spray Characteristics of Gas-Liquid Swirl Coaxial Injector

Zhongtao Kang^{a,b}, Qinglian Li^{a,b}, Peng Cheng^{a,b}, Xinqiao Zhang^{a,b}, Zhen-guo Wang^{a,b,*}

^a*Science and Technology on Scramjet Laboratory, National University of Defense Technology, Changsha, Hunan, China*

^b*College of Aerospace Science and Engineering, National University of Defense Technology, Changsha, Hunan, China*

Abstract

To understand the influence of self-pulsation on the spray characteristics of gas-liquid swirl coaxial injector, a back-lighting photography technique **has been** employed to capture the instantaneous self-pulsated spray and stable 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 self-pulsation on the spray pattern, primary breakup, spray angle, diameter and velocity distribution and mass flow rate distribution **are** analyzed and discussed. The results show that the spray morphology is greatly influenced by self-pulsation. The stable spray has a cone shape, while the self-pulsated spray looks like a Christmas tree. The main difference of these two sprays is the primary breakup. The liquid film of stable spray keeps stable while that of self-pulsated spray oscillates periodically. The film width of self-pulsated spray varies in a large range with 'neck' and 'shoulder' features existing. **The liquid film of self-pulsated spray breaks up** at the second neck, and then the second shoulder begin to breakup into ligaments. **The self-pulsated spray produces droplet clusters** periodically, **varies** horizontal spray width and mass flux periodically. From the point of spatial distribution, self-pulsation is good for the spray, it uniformizes the mass flux along radius

*Corresponding author

Email address: wangzhenguo_wzg@163.com (Zhen-guo Wang)

Download English Version:

<https://daneshyari.com/en/article/8056015>

Download Persian Version:

<https://daneshyari.com/article/8056015>

[Daneshyari.com](https://daneshyari.com)