

Abstract Submitted
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Insights into the instability mechanisms of radially lobed nozzles

NOUSHIN AMINI, Texas AM University, AARTHI SEKARAN, The University of Texas at Austin — The enhanced mixing capability of radially lobed nozzles (in comparison to circular nozzles) has promoted their use in varied applications – the precise mechanisms however are yet to be fully understood. The present study was inspired by previous experimental ((Hu et al, 2000) and numerical studies (Cooper et al, 2005) of a six – lobed nozzle. We have also carried out some preliminary hot-wire anemometry (Amini et al, 2012) and numerical studies (Amini and Sekaran, 2015, 2016) in the past, in order to qualitatively study the flow downstream from the nozzle and obtain a three-dimensional data set from Large Eddy Simulations. The current study employs a wavelet based analysis of our experimental data in order to isolate specific instability mechanisms and identifies these modes in our well resolved numerical studies. The analysis also ‘follows’ the formation and the transport of coherent structures (from within the nozzle to within the free jet) and confirms these mechanisms.

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