

Abstract Submitted
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Flow Control Characterization of PIV Flow Field Using POD¹

MATTHEW BERRY, ZACH BERGER, KERWIN LOW, ALEXIS ZELENYAK, Syracuse, SIVARAM GOGINENI, Spectral Energies LLC , MARK GLAUSER, Syracuse — The main focus of this experiment is on the analysis and flow control of a high speed jet, with a nozzle diameter 2". The flow field was investigated at Mach 0.6 using two-component large window PIV. The velocity was examined in the streamwise direction of the r-z plane with a window size of about 6 diameters. A glove fitted with 8 synthetic actuators was attached and arranged azimuthally around the lip of the jet. A signal was driven through the actuation system causing the glove to inject flow into the jet field in an attempt to clean up the jets shear layer. Sensors were set up in order to sample the near field pressure measurements and the far field acoustics simultaneously with the PIV. Low-dimensional modelling was performed on the gloves actuation system running alone; without the high speed jet. Proper orthogonal decomposition was performed at the lip of the jet, in order to observe the high energy structures of the actuation glove. Previous work shows that the first mode consists of 15% of the total energy, while the first 9 modes are responsible for approximately 40% of the total energy. Combing the PIV information with a complete hotwire velocity profile, we can gain a better understanding of how the closed loop control system is affecting the jets flow field.

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