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Experimental and Computational Investigation of a Dual-Throat Thrust Vectoring Nozzle[1] JOHN FARNSWORTH, NAVEEN PENMETSA, RYAN STARKEY, Univ of Colorado - Boulder — The dual-throat fluidic thrust vectoring nozzle is of particular interest because of its ability to provide large vector angles with minimal losses in thrust. This work investigated the performance of a dual-throat fluidic thrust vectoring nozzle for three secondary injection geometries: two spanwise oriented rectangular slots of two thicknesses, and a single spanwise oriented array of circular holes. Initial testing of the nozzles at a nozzle pressure ratio of two showed that the presence of the injection geometry alone influenced the baseline vector angle of the flow. With the introduction of secondary injection, the thinner rectangular slot was found to outperform the two other configurations at low injection percentages, while secondary injection through an array of holes trended higher at higher injection percentages. Using the experimental and computational data collected during this study, a method was developed to predict vector angle from the wall static-pressure distributions internal to the nozzle. The predicted thrust-vector angle matched the angles measured from schlieren photographs to within the measurement uncertainty across the range of injection mass flow rates tested.

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John Farnsworth
Univ of Colorado - Boulder

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