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Three methods for Aerodynamically Vectoring a Planar Jet With Steady Control Flows¹ BRANDON WILSON², BEN TIMMINS³, BARTON SMITH⁴, Utah State University — An experimental demonstration of Aerodynamic Jet Vectoring and its optimization for efficiency and stability is presented. Aerodynamic jet vectoring is an important element in new technologies for non-contact particle-size characterization, and particle detection for air quality testing. Aerodynamic jet vectoring used either a single, small, steady, suction or blowing control flow or a combination of both to redirect a two dimensional primary jet from its original path. For blowing only, three parameters are defined which influence the stability and vectoring efficiency of the vectored fluid stream. These are angle of the blowing flow with respect to the primary jet, the height of the blowing flow above the primary jet, and exit cross sectional area of the blowing flow. Vectoring efficiency is defined as the ratio of the momentum flux of the blowing to the primary jet. Alternately, it will be shown that similar vectoring can be achieved with suction control only, or with combinations of suction and blowing. Use of both suction and blowing results in much larger vectoring efficiencies, but can result in adverse flow field fluctuations.

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