Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Exploring active flow control for efficient control of separation on an Ahmed model[1] JONATHAN MCNALLY, FARRUKH ALVI, Florida State University — Active flow control is applied to an Ahmed model with a rear slant angle of 25°, where a typical flow field consists of a three-dimensional separation region on the rear slant of the bluff body. Linear arrays of discrete microjets, previously proven to effectively control this separation, are investigated further. A principal aim of this experimental study is to examine the sensitivity of control as the actuator location is shifted with respect to the separation location. Aerodynamic force and surface pressure measurements, combined with the velocity field obtained using particle image velocimetry, provide a measure of control efficacy and insight into the interaction of jet arrays with the local flow field, including the separating shear layer. An energy balance is conducted to characterize control efficiency for multiple positions over a range of microjet array blowing conditions. Results show that moving the actuator array further into the separation region requires higher microjet momentum to obtain a desired aerodynamic benefit. An empirical relationship is also developed for determining the required jet velocity as a function of position by relating the jet penetration distance to local flow features and length scales.

[1]Partial support by FCAAP and NSF.

Jonathan McNally
Florida State University

Date submitted: 01 Aug 2016 Electronic form version 1.4