Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Numerical Investigation of Virtual Aeroshaping Due to Pitched Synthetic Jets JASON LI, ONKAR SAHNI, MANE, RPI — Synthetic jets in a (non-separated) crossflow provide a virtual aeroshaping effect in a time-averaged sense, which alters the local characteristics of the crossflow such as pressure gradient. The ability to manipulate virtual aeroshaping is beneficial, e.g., jets mounted on an aerial vehicle allow for control of aerodynamic behavior. A numerical investigation is conducted to study the effects of a pitched synthetic jet actuator on virtual aeroshaping, where the resulting recirculation zones behind the actuators are analyzed. Both geometric and operational parameters of actuators are varied in simulations based on permutations of one geometric parameter: pitch angle (60^o, 75^o, 90^o), and two operational parameters: blowing ratio (to be in O(1.0-2.0)), and actuation frequency (to be in O(500-1000Hz)). In these simulations, the jet is placed in a laminar crossflow (e.g., Blasius boundary layer over a flat plate). A stabilized finite element method with implicit time integration technique is employed.

Jason Li
RPI

Date submitted: 02 Aug 2013 Electronic form version 1.4