Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Interaction of a Finite-span Synthetic-jet and Cross-flow over a Swept Wing[1] JOSEPH VASILE, YOSEPH ELIMELECH, MICHAEL AMITAY, Rensselaer Polytechnic Institute — An experimental investigation was performed to study the interaction of a single finite-span synthetic jet with the flow over a finite and swept back wing at a Reynolds number of 10^5 for three angles-of-attack. For the actuation levels, two momentum coefficients were considered, corresponding to two blowing ratios, 0.8 and 1.2. Stereoscopic PIV data were acquired in the vicinity of the synthetic-jet orifice at the wing's mid-span section. The effect of blowing ratio was analyzed using both time and phase averaged statistics. The results show that the flow field in the vicinity of the synthetic-jet orifice becomes three-dimensional and time-dependant and is governed by the superposition of two kinds of flow structures: (1) streamwise structures that are associated with the finite span of the jet (edge vortices), and (2) spanwise flow structures that are generated along the orifice's long axis due to the vortex pairs that are formed by the synthetic jet. Furthermore, an analysis of the flow field showed that the streamwise flow structures are more pronounced while the coherence of the spanwise flow structures is deteriorated within few orifice widths.

[1]Supported by AFOSR

Michael Amitay
Rensselaer Polytechnic Institute

Date submitted: 03 Aug 2010 Electronic form version 1.4