Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Computational Analysis of Turbulence and Interactions in an Array of Fluidic Oscillators for Flow Control[1] N. KOUKPAIZAN, D. HEATHCOTE, C.J. PETERSON, B. VUKASINOVIC, A. GLEZER, M. SMITH, Georgia Institute of Technology — The interactions between a spanwise array of fluidic oscillating jets and a separation bubble that is formed over a 2-D curved surface modeling the suction surface of a VR-12 airfoil are investigated numerically to capture the suppression of the separation with increasing actuation momentum. The high-fidelity simulations first examine the fully-resolved spatio- temporal evolution of the oscillating jets within the actuator cavity in a quiescent ambient. These findings are used to develop a boundary condition model for the actuator array in the cross flow. It is shown that the boundary condition model developed including turbulent variables provides good agreement with the experimental measurements of the flow control effects at a significantly reduced computational cost, and thereby enables additional insight into the flow physics in the vicinity of the actuators exit planes where the measurement techniques are limited by adequate access or resolution. The effect of turbulence on the interactions of the oscillating jets with the separated outer flow are also assessed.

[1]Supported by the Vertical Lift Research Center of Excellence (VLRCOE).

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Date submitted: 05 Aug 2019 Electronic form version 1.4