

Abstract Submitted  
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**Manipulation of Turbulent Boundary Layers Using Synthetic Jets**<sup>1</sup> ZACHARY BERGER, University of Toronto Institute for Aerospace Studies, GUILLAUME GOMIT, Southampton University, PHILIPPE LAVOIE, University of Toronto Institute for Aerospace Studies, BHARATH GANAPATHISUBRAMANI, Southampton University — This work focuses on the application of active flow control, in the form of synthetic jet actuators, of turbulent boundary layers. An array of 2 synthetic jets are oriented in the spanwise direction and located approximately 2.7 meters downstream from the leading edge of a flat plate. Actuation is applied perpendicular to the surface of the flat plate with varying blowing ratios and reduced frequencies (open-loop). Two-component large window particle image velocimetry (PIV) was performed at the University of Southampton, in the streamwise-wall-normal plane. Complementary stereo PIV measurements were performed at the University of Toronto Institute for Aerospace Studies (UTIAS), in the spanwise-wall-normal plane. The freestream Reynolds number is  $3 \times 10^4$ , based on the boundary layer thickness. The skin friction Reynolds number is 1,200 based on the skin friction velocity. The experiments at Southampton allow for the observation of the control effects as the flow propagates downstream. The experiments at UTIAS allow for the observation of the streamwise vorticity induced from the actuation. Overall the two experiments provide a 3D representation of the flow field with respect to actuation effects. The current work focuses on the comparison of the two experiments, as well as the effects of varying blowing ratios and reduced frequencies on the turbulent boundary layer.

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