Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Skin friction drag reduction on a flat plate turbulent boundary layer using synthetic jets[1] RANDY BELANGER, PIETER D. BOOM, RONALD E. HANSON, PHILIPPE LAVOIE, DAVID W. ZINGG, Institute for Aerospace Studies, University of Toronto — In these studies, we investigate the effect of mild synthetic jet actuation on a flat plate turbulent boundary layer with the goal of interacting with the large scales in the log region of the boundary layer and manipulating the overall skin friction. Results will be presented from both large eddy simulations (LES) and wind tunnel experiments. In the experiments, a large parameter space of synthetic jet frequency and amplitude was studied with hot film sensors at select locations behind a pair of synthetic jets to identify the parameters that produce the greatest changes in the skin friction. The LES simulations were performed for a selected set of parameters and provide a more complete evaluation of the interaction between the boundary layer and synthetic jets. Five boundary layer thicknesses downstream, the skin friction between the actuators is generally found to increase, while regions of reduced skin friction persist downstream of the actuators. This pattern is reversed for forcing at low frequency. Overall, the spanwise-averaged skin friction is increased by the forcing, except when forcing at high frequency and low amplitude, for which a net skin friction reduction persists downstream. The physical interpretation of these results will be discussed.

[1]The financial support of Airbus is gratefully acknowledged

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Date submitted: 01 Aug 2017 Electronic form version 1.4