Abstract Submitted
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Towards Feedback Control of Bypass Transition Using Plasma Actuators[1] RONALD HANSON, PHILIPPE LAVOIE, University of Toronto, Institute for Aerospace Studies, KYLE BADE, AHMED NAGUIB, Michigan State University, Department of Mechanical Engineering — Feedback flow control is applied to the transient-growth instability occurring in a Blasius boundary layer for the purpose of delaying bypass transition. The control signal is based on empirical modelling of the input/output flow response. The latter is obtained for both the main disturbance, generated by a roughness element array, as well as the control disturbance, introduced using a spanwise array of plasma actuators. Specifically, the targeted disturbance is characterized with streamwise velocity measurements in cross-flow planes in conjunction with streamwise-wall-shear-stress measurements over two fundamental spanwise disturbance wavelengths, downstream of the actuator location. Correlations between spanwise profiles of the streamwise strear stress and the measured disturbance velocity profiles are used to specify the control signal supplied to the actuators in conjunction with input/output model of the flow response to plasma actuation. The aim of this study is to minimize the residual disturbance energy in a closed-loop framework.

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