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Towards Feedback Control of Bypass Transition: Numerical Simulations of Laminar Boundary Layer Response to a Plamsa Actuator[1] BRANDT BELSON, CLARENCE ROWLEY, Princeton University — We study the effects of single dielectric barrier discharge (SDBD) plasma actuators as a means to delay bypass transition in the Blasius boundary layer, with the eventual goal of closed-loop control. Since streamwise streaks are the structures with the largest transient growth, we orient an array of plasma actuators so as to produce spanwise forces and streamwise vorticity, and thus directly cancel the streaks. We use a pseudo-spectral solver to perform direct numerical simulations of the effect of plasma actuators, implemented as body forces. We compare two different models for the plasma actuator, and then apply each model to our spanwise geometry. We go on to compare each model's simulation results with experiments carried out by our collaborators at University of Toronto and Michigan State University as part of a multi-university research project.

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