Abstract Submitted
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Transitory, Bi-directional Control of Wing Aerodynamics using Trailing Edge Fluidic Actuation[1] YUEHAN TAN, ARI GLEZER, Georgia Institute of Technology, RYAN PATTERSON, PERETZ FRIEDMANN, University of Michigan, Ann Arbor — Bi-directional control of the aerodynamic loads on a wing at low-to moderate angles of attack using fluidic actuation is explored in a joint experimental/numerical investigation. Transitory actuation is effected by a bistable fluidically-switched actuation jet upstream of the trailing edge (0.88c) on each of the suction and pressure surfaces. The interactions of the jets with the embedding cross flow following the onset and termination of the actuation are investigated using time-resolved measurements of the aerodynamic loads and the unsteady velocity field using particle image velocimetry (PIV). It is shown that coupled pulsed actuation on the pressure and suction surfaces leads to rapid (within 7Tconv) bidirectional changes in lift (ΔCL up to +0.52/-0.41) along with some reduction in drag. Phase-locked velocity measurements and complementary CFD simulations near the trailing edge demonstrate the temporal alteration of the balance between cross-stream transport of vorticity concentrations and of vorticity flux into the near wake.

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