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The Transient Aerodynamic Forces Effected by Trailing Edge Active Flow Control DAN BRZOZOWSKI, The Boeing Company, JOHN CULP, ARI GLEZER, Georgia Institute of Technology — The transient aerodynamic forces effected by trailing edge flow control are investigated in wind tunnel experiments using a 2-DOF traverse which enables application of time-dependent external torque and forces by servo motors. The global aerodynamic forces and moments are regulated by controlling vorticity generation and accumulation near the surface using hybrid synthetic jet actuators. The time-histories of surface pressure and aerodynamic lift and pitching moment immediately following the application of flow control are measured using simultaneous pressure, force and velocity measurements that are taken phase-locked to the commanded actuation waveform. Circulation time history that is estimated from a PIV wake survey shows that the entire flow over the airfoil readjusts within about $1.5T_{\text{CONV}}$, which is about two orders of magnitude shorter than the characteristic time associated with the controlled maneuver of the wind tunnel model. This illustrates that flow-control actuation can be typically effected on time scales that are commensurate with the flow's convective time scale, and that the maneuver response is primarily limited by the inertia of the platform.

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