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Aerodynamic Flow Control of a Moving Axisymmetric Platform¹ THOMAS J. LAMBERT, BOJAN VUKASINOVIC, ARI GLEZER, Georgia Institute of Technology — Active fluidic control of induced aerodynamic forces and moments on a moving axisymmetric platform is investigated in wind tunnel experiments. Actuation is effected by controlled interactions between an azimuthal array of integrated synthetic jets with the cross flow to induce localized flow attachment domains over the aft end of the model and thereby alter the global aerodynamic forces and moments. The axisymmetric platform is wire-mounted on a 6 DOF traverse such that each of the eight mounting wires is connected to a servo motor with an in-line load cell for monitoring the wire tension. The desired platform motion is controlled in closed-loop by a laboratory computer. The effects of continuous and transitory actuation on the induced aerodynamic forces of the moving platform are investigated in detail using high-speed PIV. The time-dependent changes in the forces are explored for model maneuvering and stabilization. It is found that the actuation induces forces and moments that are on the order of the forces and moments of the baseline flow. These measurements agree with preliminary results on the stabilization of a model moving in a single DOF demonstrating the effectiveness of the actuation for trajectory stabilization.

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Thomas J. Lambert Georgia Institute of Technology

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