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Viscous Drag Reduction on a NACA 63012A Airfoil[1] KATHERINE YATES[2], ALAN DUONG[3], THOMAS CORKE[4], FLINT THOMAS[5], University of Notre Dame — A series of wind tunnel experiments were performed in which an array of flush mounted pulsed-DC plasma actuators were utilized to reduce the skin friction drag on a NACA 63012A airfoil over a Mach number range of $0.20 \leq M_\infty \leq 0.50$ at zero angle of attack. The array of plasma actuators were designed to inhibit the lift-up and subsequent break-up of the low-speed wall streak structure to prevent the formation of streamwise vortices; a key element in wall-bounded turbulence generation. Experiments were done with two sets of actuator arrays: 1) with the electrodes aligned in the mean flow direction and 2) with the electrodes oriented 5 degrees offset to the oncoming flow. The aerodynamic load (viscous drag) was measured directly using an integrated floating element force balance. Viscous drag reduction of up to 47% was observed depending on the operating parameters of the plasma actuators. Net power savings were also achieved across the range of Mach numbers tested.

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