

Abstract Submitted
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Hybrid Manipulation of Streamwise Vorticity in a Turbulent Boundary Layer¹ ABRAHAM N. GISSEN, BOJAN VUKASINOVIC, ARI GLEZER, Georgia Tech — Manipulation of streamwise vorticity in a turbulent boundary layer is investigated experimentally at high subsonic speeds ($M = 0.5$) along converging-diverging duct wall designed to provide an adverse pressure gradient that mimics the pressure gradient in a typical offset diffuser. Counter-rotating vortex pairs and single-sense vortices are formed and characterized using conventional passive sub-boundary layer micro-ramps and micro-vanes, respectively. Fluidic analogues of these passive devices are established by using surface-mounted synthetic jet actuators. Hybrid manipulation of streamwise vorticity within the boundary layer is demonstrated by simultaneous combination of passive and active actuation which enables robust, controllable “fail-safe” operation that requires no net mass injection.

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