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Shock Wave/Boundary Layer Interaction Control in a Supersonic Inlet NATHAN WEBB, EDGAR CARABALLO, JESSE LITTLE, The Ohio State University, JIN-HWA KIM, MO SAMIMY — A shock wave/boundary layer interaction (SWBLI) occurs in a supersonic mixed compression inlet. The SWBLI could cause boundary layer separation resulting in adverse consequences such as reduced pressure recovery and non-uniform fan loading. Boundary layer bleed is currently used to prevent separation, which incurs a significant performance penalty. We have recently used Localized Arc Filament Plasma Actuators (LAFPAs) with high amplitude and wide bandwidth to control the SWBLI in a Mach 1.9 flow. The preliminary results are promising and show excellent potential for this technique. These actuators may affect the SWBLI by two mechanisms: manipulation of flow instabilities and/or streamwise vorticity generation. Particle image velocimetry measurements have confirmed that instability manipulation is the key to the LAFPAs' ability to significantly energize the boundary layer in the interaction region. The streamwise vorticity effects are currently being investigated. The LAFPAs have been tested at varying frequency, duty cycle, and mode to determine the parameters with the maximum effectiveness. Supported by AFRL and AFOSR.

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