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Active Flow Control on an Aggressive Serpentine Duct Inlet JOHN VACCARO, MICHAEL AMITAY, Rensselaer Polytechnic Institute — For military applications, inlet designs are constrained by low observability requirements, which call for the use of a serpentine inlet. The inlets purpose is to limit the lineof-sight to the compressor and decelerate the incoming flow while minimizing total pressure loss, distortion, and unsteadiness. In addition, in unmanned aerial vehicles, the inlet length can determine the overall size of the aircraft. For this reason, aggressive inlets can have a large impact on overall system efficiency. Experiments utilizing active flow control to mitigate separation in a highly aggressive serpentine duct (L/D=1.5), at Mach numbers up to 0.45, were conducted. Specifically, steady and unsteady flow control techniques were compared by measuring the static pressures along the inlet walls, the pressure recovery and distortion at the AIP, and the velocity field inside the duct using Particle Image Velocimetry. Through these experiments a better understanding of the highly three dimensional flow interactions was formulated.

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