

Abstract Submitted
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Inter-turbine Duct Flow Separation Control with SDBD Plasma Actuators: Experiment RULONG MA, JOSEPH NIEWIAROWSKI, THOMAS CORKE, FLINT THOMAS, BRIAN NEISWANDER, University of Notre Dame — Inter-turbine ducts (ITDs) need to diffuse the flow between the high and low pressure turbines in the shortest possible length to avoid an unacceptable weight penalty. Significant length reductions however can lead to separated flow regions that require flow control techniques to correct. The present research focuses on the use of single dielectric barrier discharge (SDBD) plasma actuators to prevent flow separation in aggressively expanding annular ITDs. An experimental test facility has been developed to study different ITD designs. It is designed to provide a range of inflow conditions with inlet Mach numbers from 0.4 to 0.6, turbulence intensities from 0.08 to 0.2, and different degrees of mean-flow swirl. A transparent ITD wall segment provides optical access for Laser-Doppler anemometer measurements. Other flow diagnostics include surface static pressure distributions, and surface flow visualization that are used to identify flow separation regions. The characteristics of the ITD flow and sensitivity to inflow conditions will be presented. These will be compared to flow simulations.

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