

Abstract Submitted
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Dielectric Barrier Discharge control on an unstarting supersonic flow¹ SEONG-KYUN IM, Stanford University, HYUNGROK DO, University of Notre Dame, MOONSOO BAK, MARK CAPPELLI, Stanford University — The control of unstarting supersonic model inlet flow using Dielectric Barrier Discharge (DBD) is experimentally demonstrated at Mach 4.7 flow condition. Planar Laser Rayleigh Scattering (PLRS) technique is utilized to visualize important flow features, such as boundary layers and shockwaves, at low static temperature ($\sim 60\text{K}$) and pressure ($\sim 1\text{kPa}$) freestream condition. The unstart which is initiated by jet injection in three different model inlet flow, a laminar boundary layer, tripped boundary layer without actuation, and tripped boundary layer with actuation, is demonstrated with PLRS technique. The delay of unstart process is observed through the DBD actuation of the tripped boundary layer when a single DBD actuator pair is oriented parallel to the freestream flow, generates spanwise disturbances. However, this actuation on unstart process is limited to a region of actuation.

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