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**Experimental Study of Plasma Control of an Unstarting Supersonic Flow**[1] SEONG-KYUN IM, Stanford University, HYUNGROK DO, University of Notre Dame, MARK A. CAPPELLI, Stanford University — Experimental studies of the control of unstarting supersonic model inlet flows using Dielectric Barrier Discharges (DBD) is demonstrated at Mach 4.7 flow conditions and a static temperature of ∼60K and static pressure of ∼1kPa. Planar Laser Rayleigh Scattering (PLRS) is used to visualize important flow features, such as boundary layers and shockwaves. Supersonic flow unstart is initiated by injecting mass into model inlet flows of either laminar or tripped turbulent boundary layer flow conditions. DBD discharge actuation of the tripped turbulent flow delays the unstart process, shifting the unstart dynamics closer to what is seen for the laminar boundary layer case. In all studies, a single DBD actuator pair is used, oriented parallel to the freestream flow, generating spanwise disturbances. It is proposed that strong suction flow which brings high momentum freestream flow near exposed electrode can be a mechanism of this actuation. PLRS reveals that this actuation is spatially confined to the regions close to the actuator electrodes, greatly limiting their performance.

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