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Design of a DBD Plasma Actuator Array to Control Stationary Cross Flow Modes in a Supersonic Boundary Layer CHANYONG SCHUELE, ERIC MATLIS, THOMAS CORKE, University of Notre Dame, STEPHEN WILKINSON, NASA Langley Research Center — The control of cross flow dominated laminar turbulent transition is crucial for the improvement of efficiency of supersonic aircraft. Passive methods such as distributed micron sized roughness elements have proven to work efficiently as laminar flow control devices in subsonic and as we could recently show in supersonic flows. This study describes the replacement of micron sized roughness elements with an array of dielectric barrier discharge (DBD) plasma actuators in order to excite less amplified stationary cross flow modes. These are intended to suppress the growth of the naturally occurring most amplified stationary modes. The use of DBD plasma actuators allows for a dynamic control that can respond to changing flight conditions, which is difficult to achieve with traditional roughness elements. Experiments have been performed in the 0.5 m Mach 3.5 NASA LaRC Supersonic Low Disturbance Tunnel on a 7° half angle sharp cone at a 4.3° angle of attack, and a unit Reynolds number of 250000/in.

Thomas Corke
University of Notre Dame

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