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Measurement of Velocity Induced by a Propagating Arc Magnetohydrodynamic Plasma Actuator[1] YOUNG JOON CHOI, MILES GRAY, JAYANT SIROHI, LAXMINARAYAN RAJA, The University of Texas at Austin — Plasma actuators can substantially improve the maneuverability and e?ciency of aerial vehicles. These solid state devices have low mass, small volume, and high bandwidth that make them excellent alternatives to conventional mechanical actuators. In particular, a Rail Plasma Actuator (RailPAc) has the potential to delay ?ow separation on an aerodynamic surface by generating a large body force. A RailPAc consists of parallel rails and an electrical arc that propagates along the rails with a self-induced Lorentz force. The motion of the arc transfers momentum to the surrounding neutral air. A study was conducted to understand how the motion and shape of a propagating arc couples with the ?uid momentum. In particular, we used Particle Imaging Velocimetry (PIV) and seedless PIV based on Background Oriented Schlieren (BOS) technique to measure the induced velocity of a propagating arc in one atmosphere. Results obtained provide insight into how the ?ow ?eld responds to the passage of a RailPAc electrical arc. A complete description of the RailPAc actuation mechanism can be obtained if the ?uid momentum measurements from PIV and seedless PIV are compared to the transit characteristics of an arc.

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