Abstract Submitted
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Computational Study of RailPAc Arc-Root Jets MILES GRAY, LAXMINARAYAN RAJA, University of Texas at Austin — A computational study was conducted on a magnetohydrodynamic plasma actuator called the rail plasma actuator (RailPAc). The actuator consists of two parallel, 6 in long, copper rails flush mounted on an insulating ceramic plate. When a current pulse (1kA) at 100V is supplied, an electrical arc is generated and driven along the rails by the Lorentz force generated from the interaction of the arc current with the self-induced magnetic field of the arc-electrode system. The motion of the arc induces flow in the surrounding air through compression and entrainment. This induced flow may be used to reattach flow over an aerodynamic surface. An equilibrium arc model is used to simulate the propagation of the RailPAc plasma and compliments previous experimental work focused on physical characterization of the arc. Particular focus is made on the complex interaction of macroscopic jet flows generated by the arc roots with the plasma column which has been shown in the past to be critical to reliable operation of the RailPAc actuator. Implications of these interactions on actuation efficacy and actuator design are discussed.

Miles Gray
University of Texas at Austin

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