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Effects of Electrode Oxidation on the RailPAc Plasma Actuator Gliding Arc MILES GRAY, YOUNG-JOON CHOI, JAYANT SIROHI, LAXMINARAYAN L RAJA, University of Texas at Austin — The rail plasma actuator (RailPAc) has been proposed as a high momentum atmospheric-pressure aerodynamic flow control technique using the principle of MHD forcing. We have previously studied the physics of the RailPAc device and characterized arc structure and dynamics during operation. We have recently shown that the arc dynamic behavior is strongly influenced by the state of the electrode surface and the arc root mode of attachment to that surface. These plasma surface interaction effects have significant implications for the design of practical gliding arc actuators. In this talk we report on the structure of anode and cathode root attachment as a function of the electrode surface state and their impact on overall motion of arc column and the aerodynamic forcing performance. We find that in particular, anode root attachment is the limiting process that limits the overall motion of the arc column, and hence the device performance. We also find that the oxidation state of the anode surface has strongest influence on the anode root motion and hence can be used to alleviate arc root attachment related limitations on the RailPAc performance.

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