

Abstract Submitted  
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**Experimental Study of RailPac Plasma Actuator for High-Authority Aerodynamic Flow Control in One Atmosphere** MILES GRAY, YOUNG-JOON CHOI, LAXMINARAYAN RAJA, JAYANT SIROHI, University of Texas at Austin — Dielectric barrier discharge (DBD) actuators, a type of electrohydrodynamic (EHD) plasma actuator, have generated considerable interest in recent years. However, theoretical performance limitations hinder their application for high speed flows.<sup>1</sup> Magnetohydrodynamic (MHD) plasma actuators with higher control authority circumvent these limitations, offering an excellent alternative. The rail plasma actuator (RailPac) is an MHD actuator which uses Lorentz force to impart momentum to the surrounding air.<sup>2</sup> RailPac functions by generating a fast propagating arc column between two rail electrodes that accelerate the arc through  $J \times B$  forces in a self-induced B-field. The arc column drags the surrounding air to induce aerodynamic flow motion. Our study of the RailPac will include a description of the transient arc discharge structure through high-speed imaging and a description of the arc composition and temperature through time-resolved emission spectroscopy. Time-resolved force measurements quantify momentum transfer from the arc to the surrounding air and provides a direct measure of the actuator control authority.

<sup>1</sup>D. F. Opaits et al., **J. Appl. Phys.** 104, 043304

<sup>2</sup>B. Pafford et al., **J. Appl. Phys. D.** 46, 485208

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