

Abstract Submitted  
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**Experimental study of an aerodynamics plasma actuator using emission spectroscopy**<sup>1</sup> TSITSI MADZAWA-NUSSINOV, YONGHO KIM, JAEYOUNG PARK, LOUIS ROSOCHA, VINCENT FERRERI, Los Alamos National Laboratory, GABRIEL BECERRA, Massachusetts Institute of Technology — In this paper, we report on studies of the aerodynamic plasma actuator, a special asymmetric surface discharge configuration of the dielectric barrier discharge. The configuration of the plasma actuator (one electrode exposed and a second embedded in a dielectric) employing ac power, has been proposed for flow control in aerodynamics applications<sup>[1]</sup>. The actuator operates over a wide range of frequencies with no resonant behavior, and produces stable plasma at atmospheric pressure. The mechanisms for momentum transfer to the gas molecules are still a subject of debate. Recently, studies and simulations done at Kinema Research<sup>[2]</sup> suggest that due to the non-equilibrium nature of the actuator, ions contribute more to the momentum transfer than electrons. By measuring detailed emission spectra for various discharge gases such as nitrogen and air, we compare our experimental results on electron energy distribution function with simulations done at Kinema Research. We also measure flow patterns and velocities as a function of input power and gas species, and correlate these to the changes in the calculated distribution functions.

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