

## **ELECTRICAL FORCES IN PLASMA ACTUATORS THAT RESULT IN AIR FLOW\***

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Air flow generated by plasma actuators is useful in modifying the boundary layer for aerodynamic purposes. In a paper by Boeuf *et al*<sup>1</sup> a model is developed to quantify electrical forces coupled to the bulk air in a dielectric barrier discharge and estimate air flow velocity. That model is extended to include specific ion mobility and momentum transfer to the bulk gas in a plasma actuator. For regions in the actuator with high E/N and high field gradients, a dipole force is investigated. Some air species and ion species have permanent dipole moments. And, a dipole moment can be induced in atoms, molecules, and charged species that depends on the field magnitude and electronic polarizability coefficient. Ion and neutral species properties as well as the magnitude of electrical forces coupled to the bulk gas in different regions of a dielectric barrier discharge are quantified.

1. J. P. Boeuf, Y. Lagmich, Th Unfer, Th Callegari, and L. C. Pitchford, "Electrohydrodynamic Force in Dielectric Barrier Discharge Plasma Actuators", *J. Phys. D: Appl. Phys.*, Vol. 40, 2007, pp. 652-662.

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