

Abstract Submitted  
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**The Influence of Relative Humidity on Dielectric Barrier Discharge Plasma Flow Control Actuator Performance**<sup>1</sup> M. WICKS, F.O. THOMAS, T.C. CORKE, University of Notre Dame, M. PATEL, Innovative Technology Applications Company, LLC. — Dielectric barrier discharge (DBD) plasma actuators possess numerous advantages for flow control applications and have been the focus of several previous studies. Most work has been performed in relatively pristine laboratory settings. In actual flow control applications, however, it is essential to assess the impact of various environmental influences on actuator performance. As a first effort toward assessing a broad range of environmental effects on DBD actuator performance, the influence of relative humidity (RH) is considered. Actuator performance is quantified by force balance measurements of reactive thrust while RH is systematically varied via an ultrasonic humidifier. The DBD plasma actuator assembly, force balance, and ultrasonic humidifier are all contained inside a large, closed test chamber instrumented with RH and temperature sensors in order to accurately estimate the average RH at the actuator. Measurements of DBD actuator thrust as a function of RH for several different applied voltage regimes and dielectric materials and thicknesses are presented. Based on these results, several important design recommendations are made.

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