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Acoustic Measurement of Body Forces Created by Dielectric Barrier Discharge Plasma Actuator and Comparison with Time-Dependent Empirical Model BEN MERTZ, THOMAS CORKE, SCOTT MORRIS, FLINT THOMAS, University of Notre Dame — Single Dielectric Barrier Discharge (SDBD) plasma actuators have been proven to an effective means of flow control in a variety of applications. As new applications for these actuators emerge, it has become increasingly important to develop a computationally efficient, yet accurate, numercal model to be used in CFD simulations. In previous work, a time-dependent empirical model of a SDBD plasma actuator was developed and validated using time-averaged body force vector results and experimental observations. However, the model is capable of predicting the body force field at the applied a.c. time-scale (on the order of 1 kHz). In order to validate the time-dependent behavior of the model, measurements of the body forces produced by the actuators at the a.c. time-scales are needed. In the present work, we present acoustic measurements of a SDBD plasma actuator in a hemi-anechoic environment. The measurements were taken in 5 degree increments in an arc oriented in the direction of the induced flow. Both the magnitude and phase information were considered and then compared to the results of the lumped circuit element model previously developed.

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