Abstract Submitted
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Electro-Fluid Dynamic Jets NICHOLAS CAMPBELL, University of Florida — The success of dielectric barrier discharge (DBD) plasma actuators as flow control devices in transducing electrical energy directly into near instantaneous fluid motion has been limited due to momentum loss near the wall. To increase the feasibility of these devices, they have been used to drive a channel flow, creating a jet under quiescent conditions. Electrostatic Fluid Accelerators (EFA) have also been shown to drive internal gas flows. The present work draws on the success of the DBD driven plasma channels, while exploring a new electrode configuration that stems from EFA designs, in order to actuate more of the bulk fluid. Major parameters, applied voltage and operating frequency as well as electrode gap and choice of electrode (material, shape, size); were experimentally investigated using Particle Image Velocimetry to obtain time averaged, 2D velocity fields. Results indicate significant variation of performance with these parameters and suggest that in comparison to surface DBD actuators an order magnitude improvement in efficiency is possible. Furthermore, the qualitative aspect of an electro-fluid dynamic jet shows greater versatility in application for use as both boundary layer flow control and driving internal gas flows.

Nicholas Campbell
University of Florida

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