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Investigation of Scaling Effects in Surface Dielectric Barrier Discharge Actuators ALVIN NGO, JAMEY JACOB, Oklahoma State Univ, KEDAR PAI, Plasma Bionics — Scaling effects on the plasma induced flow field of a surface dielectric barrier discharge (SDBD) actuator is investigated experimentally. The SDBD actuator consists of two asymmetrically arranged electrodes, one exposed to atmospheric air with the other encapsulated, separated by a dielectric material. Application of high voltage in ambient conditions causes a self-limiting plasma to form along the edges of the exposed electrode. An entrainment of flow near the plasma region is observed as momentum is transferred into the quiescent atmospheric air. The impact of varied dielectric material, dielectric thickness, and electrode gap distance is evaluated using PIV and optical techniques to observe the induced flow and plasma intensity, respectively. The induced flow outputs are found to be affected significantly by the dielectric material changes and moderately by the thickness and gap distance changes. The induced flow from various actuator types are compared and their overall effectiveness at transferring momentum into the flow is examined.

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