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Force measurements and simulations of DBD plasma actuators operated in quiescent air[1] ALAN R. HOSKINSON, NOAH HERSHKOWITZ, University of Wisconsin - Madison — Recent years have seen significant interest in using dielectric barrier discharge plasmas on surfaces to drive neutral gas flow. Here we have measured the forces exerted by these plasma actuators on atmospheric pressure air using two methods—indirectly via stagnation probe measurements of the induced air velocity and directly via an electronic balance—and compared the results to each other and to 2-dimensional simulations. The measurements and simulations have been repeated for discharge geometries with one or both electrodes insulated and a range of electrode sizes. Data from the two experimental techniques show an exponential increase in the induced force as one of the electrode diameters decreases. The simulations, which couple fluid transport equations to Poisson's equation, show the same general trend. The simulation runs also provide more detail on plasma structure than can currently be observed experimentally.

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Alan R. Hoskinson
University of Wisconsin - Madison

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