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Experimental investigations of a simple DBD-based flow actuator YACINE BABOU, ANNA-ELODIE KERLO, SEBASTIEN PARIS, The von Karman Institute for Fluid Dynamics — Optical, electrical and effectiveness measurements of a single dielectric-barrier discharge (DBD)-based flow actuator operating in ambient quiescent air will be presented. The actuator is constituted by two thin alumina foil electrodes asymmetrically displayed on both sides of a dielectric (MACOR) plate ($\sim 50 \text{ cm}^2$) and powered by an AC sinus high frequency ($\sim 10 \text{ kHz}$) high voltage ($\sim 10 \text{ kV}$ peak-peak). The experiments were done for a wide range of configurations and operating conditions. The current in the electrical circuit is constituted of a periodic contribution and of short pulses of few ns related to streamers propagation. Thermodynamic state was characterized by means of conventional optical emission spectroscopy technique. A typical gas temperature of 295 K is obtained with the N_2 second positive system rotational bands, whereas vibrational temperature is about 2500 K. The induced flow velocity and the produced thrust were gauged by means of simple techniques and are respectively of order 1 m/s and 0.1 g. Unsteady operations and applications to realistic situations will be presented.

Yacine Babou
The von Karman Institute for Fluid Dynamics

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