The relationship between DBD performance in ambient and flowing air

MOHAMMED SIDDIQUI, ALI GULEC, LUTFI OKSUZ, RICCARDO BONAZZA, NOAH HERSHKOWITZ, University of Wisconsin - Madison — Dielectric barrier discharges (DBDs) have been shown to reduce flow separation on airfoils in flowing air [1], as well as impart momentum into ambient air [2]. The relationship between DBD performance in both regimes is not well understood. We previously investigated a novel DBD discharge regime in ambient air first discovered by Hoskinson et. al.[3], where for cylindrical exposed electrodes, as the electrode diameter was reduced below 50 \( \mu \)m, the force divided by power dissipated in ambient air increased exponentially. We now investigate the ability of these DBDs to reduce flow separation in flowing air of \( Re \sim 5E5 \) and how it relates to their discharge characteristics in ambient air. The results are presented here for the first time.