

# Numerical Study of the Extended DBD for Flow Control

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*Abstract*—A single DBD actuator cannot be used in large-scale applications because of its low EHD wind velocity (up to 7 m/s). In order to enhance the thrust, the extended DBD based on a three-electrode configuration has been experimentally studied. The extended DBD system consists of three strip electrodes, one exposed and powered by a high AC voltage, one exposed and connected to a positive DC voltage, the other one is buried in the dielectric layer and can either be grounded or connected to the positive DC voltage.

This paper proposes a numerical model of the extended DBD, and investigates the geometric configurations that would affect its performance. The simulation results of the extended DBD are compared with that of a single DBD with respect to current, velocity profiles and EHD force. These results confirm the experimental observations that the extended DBD cannot significantly enhance the EHD flow velocity. The reason for this is clarified in this paper.