Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Optimization of Dielectric-Barrier-Discharge Vortex Generators by numerical simulation[1] PATRICIA SUJAR GARRIDO, KTH Engineering Mechanics, MARLEY BECERRA, KTH Electrical Engineering, P. HENRIK ALFREDSSON, RAMIS ÖRLÜ, KTH Engineering Mechanics — A Dielectric-Barrier-Discharge (DBD) actuator has various design parameters related to its geometry, electrical settings, and the materials used which affect its efficiency. In the particular case of DBD Vortex Generators the parameter space is increased by the wavelength, the direction of the flow angle, and the orientation for a formation of co- or counter-rotating vortices. For its optimization for practical applications, all these parameters can be hardly manipulated isolating their dependencies in experimental investigations. A cost-efficient way to manage this optimisation process is by numerical simulations. The most used numerical model (Suzeng-Huang Model) simulates the DBD's effects, but it needs as input parameters physical quantities that cannot be directly measured. They are instead tuned to agree with a given set of experimental data. Hence, velocity and electric measurements of a single DBD are used for calibrating the SH model. The assessment of this model in the context of an optimization study for DBD VGs, incorporating the electrical point of view, by combining experimental and numerical studies, is currently on the way.

[1]Support by the Swedish Energy Agency (46344-1) is acknowledged.

Patricia Sujar-Garrido
KTH Engineering Mechanics

Date submitted: 10 Aug 2020 Electronic form version 1.4