

Time-Resolved Investigations of Electrohydrodynamic Flow Evolution in Needle-to-Plate Positive Corona Discharge

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Abstract— In our study we focused on an EHD flow generated by a high voltage positive pulse in a needle-to-plate corona discharge arrangement. We performed the temporal and spatial resolved measurements of the EHD flow evolution just after the corona discharge onset by using Time- Resolved Particle Image Velocimetry (TR PIV) equipment. The flow and velocity field (PIV) images, recorded just after the corona discharge onset (in intervals from tens to hundreds us) illustrate the evolution of the EHD flow. They show the formation of a particle flow in a narrow channel below the needle electrode just after applying high voltage, then the channel expands and the flow velocity in the channel rises. This movement initiates a flow of the seeded gas from the needle-tip neighbourhood into the plate electrode, where spreads to the sides and develops in form of regular vortices.