

Electrical Engineering Laboratory of Oran

Scaling laws between mono and multi-point configurations in positive **DC corona discharge in air**

D Raouti (Dr), S Flazi (Pr), D Benyousef (Dr), A Mokadem (Dr) in partnership with Pr, O. Eichwald, LAPLACE laboratory Toulouse

objectives

> Study of the evolution trend of the electrical parameters representing the electrical behavior of a positive DC point-plan corona discharge by increasing the number of tips. > Searching and establishment of possible scaling laws, which can exist when moving from a single-point to plan configuration to another with multi-points.

Steps

Establishment of an equivalent circuit model of the positive DC point to plan corona discharge based on a deep theoretical and experimental (electrical and optical measurements) study of the discharge.

✓ identification of electrical parameters of the equivalent model using mathematical RLS (recursive least square) method.

✓ Comparison between the electric parameters of discharge obtained in the case of electrode configurations with one and two points, spaced apart and close together.

INTRODUCTION

interest of positives point-plane corona discharges

- *Effective treatment of toxic gas discharge on stream or stationary at discharge* or post-discharge phase with a possibility of control through external parameters such as: Supply voltage (waveform), gas , inter-electrodes distance....
- 2. Best cost energy (low current of about some mA in the absence of a dielectric barrier)
- 3. Easy Integrability in industrial systems producing toxic gaseous pollutants

Objectives of this work:

Obtaining and comparing the electrical parameters of the equivalent model of the discharge in the case of a single point and two points, spaced apart and close together.

conduct a preliminary study to investigate and establish a possible scaling laws which can exist between the electrical parameters in the transition from a single to

EXPERIMENTAL DEVICE



FIG.1. Simplified scheme of the experimental device.



RESULTS

Identified electrical parameters and currents validation





Schema of different studied configurations

Compared Identified electrical parameters

PERSPECTIVES

Study of the electrical behavior of the multi-point to plan corona discharges under a continuous supply for any number of tips.

*****Search of scaling laws and study of electrical behavior of mono and multi-point-to-plane corona discharges under an impulse supply.

Acknowledgements

This work is done in partnership with the professor O. Eichwald (PRHE research team, LAPLACE Laboratory, Toulouse, France)