

Abstract Submitted  
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**Semi-analytical modelling of positive corona discharge in air<sup>1</sup>**

FRANCISCO PONTIGA, University of Seville, KHELIFA YANALLAH, Université Ibn Khaldoun, Algeria, JUNHONG CHEN, University of Wisconsin-Milwaukee, USA — Semianalytical approximate solutions of the spatial distribution of electric field and electron and ion densities have been obtained by solving Poisson's equations and the continuity equations for the charged species along the Laplacian field lines. The need to iterate for the correct value of space charge on the corona electrode has been eliminated by using the corona current distribution over the grounded plane derived by Deutsch, which predicts a  $\cos^m\theta$  law similar to Warburg's law. Based on the results of the approximated model, a parametric study of the influence of gas pressure, the corona wire radius, and the inter-electrode wire-plate separation has been carried out. Also, the approximate solutions of the electron number density has been combined with a simplified plasma chemistry model in order to compute the ozone density generated by the corona discharge in the presence of a gas flow.

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