

Abstract Submitted
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Two-dimensional modeling of the ignition phase of an atmospheric-pressure argon DBD using FEniCS¹ ALEKSANDAR JOVANOVIĆ, DETLEF LOFFHAGEN, MARKUS M. BECKER, Leibniz Institute for Plasma Science and Technology, Felix-Hausdorff-Str. 2, 17489 Greifswald, Germany — The ignition of a single-filament dielectric barrier discharge (DBD) in argon at atmospheric pressure is analysed by means of the two-dimensional finite element discharge modelling code FEDM. This new open source code is developed on the basis of FEniCS (<https://fenicsproject.org>) and implements balance equations for the relevant plasma species, the electron energy balance equation, Poisson's equation for the electric potential and a surface charge balance equation. The present study focuses on the initial streamer propagation phase in an asymmetric single filament DBD with hemispherical electrodes. The metallic high-voltage electrode is directly exposed to the plasma, while the grounded electrode is covered by a dielectric. The obtained results show that the properties of the positive streamer breakdown sensitively depend on the description of the electron component. In comparison with standard models, faster streamer propagation is predicted by the consistent drift-diffusion approximation, which is based on a four-moment model.

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