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Two-dimensional numerical study of atmospheric pressure glows in helium[1] PENG ZHANG, UWE KORTSHAGEN, Department of Mechanical Engineering, University of Minnesota — Atmospheric pressure glow discharges (APGs) have attracted significant attention due to their spatially homogenous plasma properties. Unfortunately, at atmospheric pressure a glow discharge has a strong tendency to transform into a non-uniform filamentary dielectric barrier discharge (DBD). The transition between filamentary DBDs and uniform APGs is studied by a two-dimensional fluid model. The results show that the discharge structure is affected by many operating parameters, including the dielectric constant and the thickness of the barriers, the driving frequency, and the voltage amplitude. For instance, an increase in the applied low-frequency voltage leads to an increase in the number of plasma filaments. In addition, the influence of the gas properties such as the ionization coefficient, and the mobility and diffusion coefficients of charge carriers is investigated. It is found that a uniform glow discharge is more easily achieved in a gas with higher ionization coefficient at a relatively low electric field. The ion transport properties have a larger influence on the discharge structure than those of the electrons.

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