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On the Influence of the Dielectric Barriers on the Atmospheric Pressure Glows in Helium PENG ZHANG, NING ZHOU, ESI-CFD, 6767 Old Madison Pike NW, Suite 600, Huntsville, AL 35806, UWE KORTSHAGEN, Dept of Mechanical Engineering, Univerisity of Minnesota, 111 Church Street SE, Minneapolis, MN 55414, ESI-CFD TEAM, UNIVERSITY OF MINNESOTA TEAM —
Based on a two-dimensional fluid model with a local field approximation, the atmospheric pressure glow discharges (APGs) with two dielectric barriers in helium with nitrogen impurities are studied. The model self-consistently solves the Poisson equation for the electric field and the continuity equations for the densities of all species. The momentum equations are simplified by the drift-diffusion flux. The electrons, helium atomic and molecular ions, helium metastables, and nitrogen molecular ions are included in the simulation. The model successfully predicts the formation of self-organized filaments in the discharge gap. The results showed that smaller number of filaments forms for dielectric material with lower permittivity. And a uniform Townsend-like discharge can be obtained by using of a material with lower permittivity. Based on the simulation model, the APG initiation process in the reactor with a single dielectric barrier is studied. And the influence of the thickness of the dielectric is also investigated.

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