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Influence of the amount of N_2 admixture on the dynamics of atmospheric pressure helium discharges in capillary tubes ANNE BOURDON, FRANCOIS PECHEREAU, PEDRO VIEGAS, EM2C laboratory, Ecole Centrale Paris — Since a few years, atmospheric pressure helium microplasma jets ignited in thin dielectric tubes have received considerable interest due to their potential for biomedical applications. In particular, the propagation of discharges in long capillary tubes is studied for the development of medical devices for endoscopic applications. In [1], experiments have been carried out to study the influence of various amounts of N_2 admixture on the characteristics of a helium discharge in long capillary tubes. In this work, we study with a 2D fluid model the discharge characteristics in conditions close to those used in experiments. Simulation results show that the discharge dynamics and structure depend on the amount of N_2 admixture and the applied voltage. In particular, as the amount of N_2 admixture increases, the propagation velocity of the discharge in the tube first increases and then decreases, as observed in experiments. To explain these results, a detailed analysis of the kinetic scheme of He-N_2 mixtures with various amounts of N_2 is presented. The influence of other parameters as the initial preionization level, the tube material and the shape of the applied voltage are also discussed.

[1] T. Darny, E. Robert, S. Dozias and JM. Pouvesle, Proceedings of GD2014

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