Performance optimization of an EHD thruster: the influence of secondary emission and the electrodes gap. VICTOR H. GRANADOS, PAULO A. SA, University of Porto, MARIO J. PINHEIRO, IST - University of Lisbon — We have developed a numerical model to study the performance (thrust, maximum output velocity of the fluid and thrust-to-power ratio) of a single-stage electrohydrodynamic (EHD) thruster with a rod anode and a funnel-like cathode configuration. The electrohydrodynamic processes embody interlocking aspects of non-compressible gas dynamics (Navier-Stokes equations), ionized gas physics, self-consistent accelerating electric field adequately described by Poisson equation and migration of charged particles in an electric field in the drift-diffusion approximation. We considered the following neutral and ionized nitrogen species as the working media: N, N^+, N_2, N_2^+, and N_4^+. In order to optimize the thruster performance, we present two studies: i) a sweeping of the gap between electrodes in order to detect the optimal distance for the proposed model; and ii) a study of the influence of the secondary electron emission coefficient, γ_i, on the discharge mechanism, as γ_i relies on the material used to build the cathode. The working pressure employed in the simulations is 10 Torr (1.3 kPa) and the gas temperature is 300 K.

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