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Optimizing an EHD cylindrical plasma thruster.[1] EDUARDO CALVO, University of Porto, MARIO PINHEIRO, University of Lisbon, PAULO SA, University of Porto — The design and optimization of an EHD thruster needs a good knowledge of the flow pattern imposed by the electrode (and its nature) geometry and the morphology of the electric potential. The aim of this work is to optimize a previously developed self-consistent model of single-stage electrohydrodynamic (EHD) thrusters for space applications [1]. The EHD thruster structural components are a needle-type anode and cylindrical cathode. The propellant gas is argon, at a pressure of 10Torr and a temperature of 300K. It was investigated the sliding effect of the electric field in a dielectric surface by introducing a chimney shape dielectric beneath our cathode. With the increase of the aperture angle, the morphology of the electric potential and field lines inside the cathode are changed and the species distributions vary as well. In these circumstances, there is an increase of the net thrust. We also study some aspects of the cylindrical intrinsic geometry considered for the cathode under the action of a voltage range 3-20 kV: inner radius and cylindrical height. Finally, the influence of the secondary electron emission coefficient was also analyzed. We found that in the maximized cases, Ar develops a thrust of 2.75 μN and a thrust-to-power of 295 mN/kW.

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