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Modeling of a microwave plasma torch[1] L.L. ALVES, IPFN/IST, Lisbon, Portugal, R. ALVAREZ, ICMSE/CSIC, Sevilla, Spain, L. MARQUES, IPFN/IST, Lisbon, Portugal, S.J. RUBIO, A. RODERO, M.C. QUINTERO, Dep. Fis/UCO, Cordoba, Spain — This paper presents simulation results for a microwave plasma torch (MPT, at 2.45 GHz). The particular device under study couples the MPT (connected to a coaxial waveguide) to a cylindrical reactor chamber, where it produces helium plasma at atmospheric pressure. The study gives a 2D description of the MPT-reactor system, based on an electromagnetic model (that solves Maxwell's equations adopting a time-harmonic description, to calculate the distribution of the EM fields and the average power absorbed by the plasma) and a hydrodynamic model (that solves the Navier-Stokes' equations for the flowing neutral gas, to calculate the distribution of velocities, mass density, pressure, and temperature within the reactor). Model results, such as the power transmission coefficient and the gas temperature, are particularly dependent on the reactor dimensions, the electron density and temperature, and the gas input flow. Comparison between simulations and measurements reveals common variation trends, with changes in the reactor height, for the power reflected by the system, and yield a qualitative agreement for the axial profile of the gas rotational temperature.

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