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Contraction phenomena in surface wave driven plasmas in Ar: what are the real causes of contraction?[1] MARCO ANTONIO RIDENTI, JAYR DE AMORIM, Technological Institute of Aeronautics (ITA), VASCO GUERRA, Instituto Superior Tcnico (IST), GEORGE PETROV, United States Naval Research Laboratory (NRL), ARNALDO DAL PINO, Technological Institute of Aeronautics (ITA) — In this work we designed a model to describe a surface wave driven plasma in argon at atmospheric pressure. We included the detailed chemical kinetics dynamics of Ar and solved the mass conservation equations of the relevant neutral excited and charged species. The gas temperature radial profile was calculated by means of the thermal diffusion equation. The ground state density was estimated assuming the ideal gas law. The electric field radial profile was calculated directly from the numerical solution of the Maxwell's equations assuming the surface wave to be propagating in the TM_{00} mode. The problem was considered to be radially symmetrical, the axial variations were neglected and the equations were solved in an auto consistent fashion. We probed the model results considering three scenarios: (i) the electron energy distribution function (EEDF) was calculated by means of the Boltzmann equation; (ii) the EEDF was considered to be Maxwellian; (iii) the dissociative recombination was excluded from the chemical kinetics dynamics, but the non-equilibrium EEDF was preserved. From this analysis, we established that dissociative recombination is the leading mechanism in the constriction of surface wave plasmas.

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