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Modeling of capacitively coupled radio-frequency discharges in nitrogen[1] L. MARQUES, C.D. PINTASSILGO, L.L. ALVES, IPFN/IST, Lisbon, Portugal, G. ALCOUFFE, G. CERNOGORA, LATMOS/UVSQ, Verrieres le Buisson, France — This paper reports the modeling of capacitively coupled radio-frequency discharges (13.56 MHz) in pure nitrogen, produced within a cylindrical parallel-plate reactor, similar to a GEC reference cell surrounded by a lateral grounded grid, at 0.2-3 mbar pressures and 5 -30 W coupled powers. This reactor is used to simulate, at laboratory scale, the N_2/CH_4 chemistry of Titan's atmosphere. We have used a 2D, time-dependent fluid-type code to describe the transport of electrons and positive ions N_2^+ and N_4^+ in the reactor, coupled to a 0D kinetic code for N_2. The fluid code solves the charged particle and the electron mean energy transport equations, coupled to Poisson's equation for the RF electric potential. The kinetic code solves the electron Boltzmann equation and the rate balance equations of 45 vibrationally excited states and 7 electronically excited states of the N_2 molecule, yielding a set of electron transport parameters and rate coefficients for the charged particle production and destruction. Model results are compared to measurements of the self-bias potential, the average electron density, and the line intensities of the FNS(0-0) [N_2^+(B,0)-N_2^+(X,0)] and of the SPS(0-2) [(N_2(C,0)-N_2(B,2)].

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