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Global model of instabilities in low-pressure inductively coupled chlorine plasmas EMILIE DESPIAU-PUJO, PASCAL CHABERT, LPP - Ecole Polytechnique — Experimental studies have shown that low-pressure inductive discharges operating with electronegative gases are subject to instabilities near the transition between capacitive (E) and inductive (H) modes. A global model, consisting of two particle balance equations and one energy balance equation, has been previously proposed to describe the instability mechanism in $SF_6/ArSF_6$ [1]. This model, which agrees qualitatively well with experimental observations, leaves significant quantitative differences. In this paper, the model is revisited with Cl_2 as the feedstock gas. An alternative treatment of the inductive power deposition is evaluated and chlorine chemistry is included. Old and new models are systematically compared. The alternative inductive coupling description slightly modifies the results. The effect of gas chemistry is even more pronounced. The instability window is smaller in pressure and larger in absorbed power, the frequency is higher and the amplitudes of oscillations are reduced. The feedstock gas is weakly dissociated ($\approx$ 16%) and $Cl_2^+$is the dominant positive ion, which is consistent with the moderate electron density during the instability cycle. [1] M.A. Lieberman, A.J. Lichtenberg, and A.M. Marakhtanov, Appl. Phys. Lett. 75 (1999) 3617

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