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Model of the dynamics of the self-pulsing regime in a micro hollow cathode discharge in argon CLAUDIA LAZZARONI, PASCAL CHABERT, ANTOINE ROUSSEAU, Laboratoire de Physique des Plasmas — Under certain conditions, a micro hollow cathode discharge (MHCD) presents a self-pulsing regime despite a continuous power supply, where the discharge current and the discharge voltage oscillate with a frequency of several tens of kHz. Based on the works of Hsu *et al.* (2003) and Aubert *et al.* (2006), an equivalent circuit model is proposed to understand the physics of these oscillations. A model of the non-linear resistance is proposed and the dynamics is analyzed. The model reproduces the electrical signals observed experimentally. The discharge current obtained thanks to this electrical model is used as an input parameter of a zero dimensional unstationnary model of the argon plasma. This global model combines the particle and the energy balance equations. The temporal evolution of the species densities (electrons, atomic and molecular ions, metastables) and of the electron temperature are obtained during the cycles of the self-pulsing. The electron density, which can reach a maximum of 10^{16} cm^{-3} at 150 Torr, follows the temporal evolution of the discharge current with slightly longer characteristic rise and decay times.

Claudia Lazzaroni
Laboratoire de Physique des Plasmas

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