Abstract Submitted
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Experimental study of plasma parameters and discharge instabilities in 500W Hall effect thruster[1] VICTOR DSANGLES, SERGEY SHCHERBANEV, THOMAS CHAROY, PASCAL CHABERT, ANNE BOURDON, Laboratoire de Physique des Plasmas (LPP), CNRS, Ecole polytechnique — Hall-Thrusters (HT) are known from the 60's and are now routinely used for spacecrafts propulsion. Nevertheless, some key physical phenomena happening inside the engine channel are still to be understood and it puts a curb on the development of low-power HT. An effort is currently made towards the development of predictive models based on PIC simulations. These works have demonstrated the importance of oscillatory effects such as the electron cyclotron drift instability (ECDI) in the axial anomalous transport of electrons. Nevertheless, quantitative studies of these fluctuations are still to be done. We propose to develop experiments both to validate the above mentioned PIC simulations and to characterize the instabilities at play. Our study is carried out on a 500W PPS-type HT in Argon and Xenon with a cathode made of a 0.25 mm diameter W/Th (1%) filament. The discharge biasing is varied from 80 to 400 V and the gas flow rate between 1.0 and 3 mg/s. The plasma parameters are analyzed in the plume of the thruster using Langmuir probes and emission spectroscopy (OES) coupled with a collisional-radiative model (CRM) . The electron energy distribution function used in the CRM is compared to the one obtained using the PIC code.

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