Abstract Submitted
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Hall thrusters instabilities analysis with 2D (axial-azimuthal) Particle-In-Cell simulations[1] THOMAS CHAROY, ANTOINE TAVANT, ANNE BOURDON, PASCAL CHABERT, Laboratoire de Physique des Plasmas, CNRS, Ecole polytechnique — In the last decade, Hall-Effect Thrusters (HET) have been widely used for spacecraft propulsion. However, even though many studies have been conducted, the electron transport across the magnetic field is still not well understood. It has been experimentally observed by Meezan et al. that the electron mobility across the discharge chamber is higher than the one expected with the classical collisional theory. Recent studies have shown that this anomalous transport could be due to the Electron Cyclotron Drift Instabilities (ECDI). Nevertheless, many other instabilities can be observed in a HET, with a wide range of frequencies and they might also affect the discharge behavior.
2D Particle-In-Cell (PIC) simulations of the axial-azimuthal plane of a HET have been performed with *LPPic*, a code previously validated with a 1D Helium benchmark and a 2D ExB benchmark. Compared to the latest, here we solved the neutral gas dynamic self-consistently and hence, we were able to capture the breathing mode oscillations along with the ECDI. We studied the coupling between these two instabilities, with comparison to the theory recently developed by Lafleur et al. The influence of discharge parameters and numerical models on the discharge behavior is also shown.

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