Abstract Submitted
for the GEC17 Meeting of
The American Physical Society

Student Excellence Award Finalist: Entangled effects of electron drift instability and secondary electron emissions in Hall effect thrusters: Insights from 2D PIC computations[1] VIVIEN CROES, ANTOINE TAVANT, LPP / Safran Aircraft Engines, TREVOR LAFLEUR, LPP / CNES, ANNE BOURDON, PASCAL CHABERT, LPP / CNRS, COLD PLASMAS TEAM — Since Hall effect thrusters (HETs) are one of the most successful electric propulsion (EP) technologies, the need for improved predictive models is increasing. Yet HETs complexity makes it difficult to understand and predict the plasma discharge behavior. One of the topic is that electron mobility across the imposed magnetic field in the channel discharge is anomalously high in comparison to predictions from classical diffusion theories. Multiple mechanisms have been proposed: Secondary electron emissions, sheath instabilities, gradient driven instabilities, or electron drift instabilities. Effect of these drift instabilities on the electron mobility has been recently investigated theoretically, and compared to $r-\theta$ simulations using a simplified 2.5D PIC simulation model. However in these simulations, walls were assumed to be metallic with no secondary electron emission. In this work we compare results obtained with metallic and dielectric walls, with and without secondary electron emissions (using various models). These improvements enable a deeper look into the behavior of the thruster operation, and allow us to differentiate the relative importance of the mechanisms producing enhanced electron transport.

[1]Safran Aircraft Engines / ANRT

Vivien Croes
LPP / Safran Aircraft Engines

Date submitted: 16 Jun 2017 Electronic form version 1.4