Abstract Submitted
for the GEC18 Meeting of
The American Physical Society

Effects of electron-drift instability in 1D fluid simulations of Hall Effect Thrusters[1] ROBERTO MARTORELLI, Ecole Polytechnique, TREVOR LAFLEUR, PlasmaPotential - Physics Consulting and Research, ANNE BOURDON, PASCAL CHABERT, Ecole Polytechnique — A key problem of Hall Effect Thruster(HET) is the understanding of the anomalous electron transport. Recent studies have suggested as a possible cause the electron-drift instability (EDI), driven by the relative motion of electrons respects to the ions in the $\mathbf{E} \times \mathbf{B}$ direction of the thruster. Although the recent success in describing the instability and its consequences on the electron transport, few attempts have been performed to include such effects in a fluid simulation of HET, in which the anomalous transport is still artificially enhanced in order to fit experimental results. We propose in this work a comparison between the macroscopic effects induced by the EDI and the corresponding ones obtained by the ad-hoc transport. The HET is modeled through a 1D fluid simulation reproducing the axial direction of the thruster. An expression for the instability-induced friction force and power loss can be obtained from quasi-linear theory, providing the corrections to the transport equations induced by the instability. The results show a good agreement between the transport induced by the instability and that obtained from the artificial mobility, further suggesting that the relevance of the EDI in causing the anomalous electron transport.

[1]RM, PC, and AB acknowledge support from the CHEOPS project that has received funding from the European Unions Horizon 2020 research and innovation programme under grant agreement No. 730135

Roberto Martorelli
Ecole Polytechnique

Date submitted: 14 Jun 2018 Electronic form version 1.4