Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Comparison between multifluid and Particle-In-Cell (PIC) simulations of instabilities and boundary layers in low-temperature low pressure magnetized plasmas for electric propulsion applications.[1] LOUIS REBOUL, CMAP/LPP, Ecole polytechnique, ALEJANDRO ALVAREZ LAGUNA, LPP/CMAP, THIERRY MAGIN, VKI, PASCAL CHABERT, ANNE BOURDON, LPP, MARC MASSOT, CMAP — The objective of this work is to assess some of the potential advantages and limitations of finite volume method applied to multifluid equations as compared to Particle-In-Cells (PIC) methods. Hydrogen and Argon plasma discharges in 2D are simulated using a two-fluid isothermal Euler-Poisson equations finite volume method. The structure of sheaths in non-magnetized cases, and the appearance of instabilities in magnetized cases are compared with PIC simulations. We also present preliminary result obtained via a second order discretization finite volume methods using Adaptive Mesh Refinement (AMR) method. Finally, we present ongoing work on adapting a recently developed asymptotic preserving method to the 2D framework presented here. We aim at showing that, and evaluating to what extent, fluid models associated with tailored numerical methods have a lot of potential for plasmas of interest in electric propulsion applications.

[1]This work is funded by a joint grant from Region Ile-de-France and Agence Innovation Defense.

Louis Reboul
CMAP/LPP, Ecole polytechnique

Date submitted: 16 Jun 2020 Electronic form version 1.4