

## **List of main changes**

We list below a list with the main changes carried out on the revised version of the manuscript according to the reviewers and editor comments:

- 1) The title has been changed to avoid the impression that the study focuses on a comparison of numerical algorithms, rather than on addressing relevant physical phenomena governing the behavior of the plasma in the near plume of Hall effect thrusters.
- 2) The abstract and the introduction have been modified to better highlight the main motivation, focus and objectives of our work.
- 3) Section II.A now includes references to our previous works where the model equations and their numerical implementation are detailed. Besides,
- 4) Section II.B now includes details about the number of particles per cell used for the simulations. We also clarify that all results shown in the study are time-averaged over a sufficiently large number of breathing mode cycles. The computational times have also been included.
- 5) Section II.C has been modified to clarify the conditions at the plume boundary
- 6) Section III has been deeply modified to improve both clarity and conciseness, and to better emphasize the key physical insights derived from the results. The distortion induced by the local plume condition (LPC) in the plasma solution, including the electric and electron currents, the plasma potential, the electron temperature and the dynamics of charge exchange ions, are now better quantified. Figures 2, 4 and 5 have been modified to better address the scientific discussions, according to referees' suggestions.
- 7) Section IV has also been deeply modified to improve clarity, deliver a more direct and focused message on the key physical insights derived from the results, and better emphasize the benefits of the GPC over the LPC. Figures 6 and 7 have been modified to better address the scientific discussions, according to referees' suggestions.
- 8) The Conclusions section has been modified accordingly.

Other minor changes in the text, addressing the reviewers' comments and suggestions, have been highlighted in red in the revised version of the manuscript and are referred to in the point-by-point replies to the referees.