

Abstract Submitted
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Quantifying Plasma transport in ROBIN negative ion source: PIC-MCC Simulations vs. Experiments BHASKAR CHAUDHURY, MIRAL SHAH, Group in Computational Science and HPC, DAIICT, Gandhinagar, India, 382007, MAINAK BANDYOPADHYAY, ARUN CHAKRABORTY, ITER-India, Institute for Plasma Research (IPR), Gandhinagar, India, 382428 — The RF based negative ion source ROBIN (Rf operated Beam source in India for Negative ion research) has been setup at IPR, India to investigate the different issues related to production, transport and extraction of negative hydrogen ions in negative ion sources for fusion applications. Quantifying plasma transport accurately in such sources is a challenging task, since the presence of non-uniform electric and magnetic (magnetic filter) field leads to different diffusion phenomena (classical, ambipolar, anomalous etc). The primary challenge is to understand the role of different diffusion and collisional processes in addition to the role of density gradients and drifts. We have used our in-house parallel 2D-3v PIC-MCC code [1] to quantify the role of different physical processes responsible for the plasma transport across magnetic filter under conditions similar to real ROBIN experimental setup [2]. The simulation results show similar behaviors as observed during the first phase of ROBIN experiments (without negative ions), and we have used exhaustive PIC simulations to quantify the contribution of different physical processes responsible for the plasma transport across magnetic filter.

1. Chaudhury B. et al., Hybrid Parallelization of PIC-MCC Algorithm for Simulation of Low Temperature Plasmas. *Communications in Computer and Information Science*, vol. 964, 2019.
2. Bansal G., *Negative ion beam extraction in ROBIN*, *Fusion Eng. Des.* **88**, 2013.

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