

Abstract Submitted
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2D PIC-MCC simulations of plasma dynamics across magnetic field lines: application to ROBIN negative ion source BHASKAR CHAUDHURY, MIRAL SHAH, Group in Computational Science and HPC, DAIICT, Gandhinagar, India, MAINAK BANDYOPADHYAY, ARUN CHAKRABORTY, ITER-India, Institute for Plasma Research, Gandhinagar, India and HBNI, Mumbai — The physics of plasma dynamics across strong magnetic field lines in negative ion sources is a complex phenomenon. 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. The source consists of a driver, an expansion chamber, a magnetic filter and extraction grids. Magnetic filter plays an important role in reducing electron temperature inside the source, which is necessary to increase the negative ion yield. We require accurate computational models to completely understand the experimental results, and the complex plasma dynamics inside ROBIN. As a first step in this direction, we have developed an in-house parallel electrostatic 2D-3v PIC-MCC code to understand the collisional transport across magnetic filters under conditions similar to real ROBIN. Using this code, we have investigated different plasma characteristics such as plasma potential, electron temperature, electron and ion densities, current etc. as well as the effects of filter field on plasma transport. Several numerical experiments have been performed, and the simulation results show similar qualitative and quantitative behaviors as observed during the first phase of ROBIN experiments (without negative ions).

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