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2D
axial-azimuthal Particle-In-Cell benchmark for low-temperature magnetized plasmas THOMAS CHAROY, Laboratoire de Physique des Plasmas, JEAN-PIERRE BOEUF, LAPLACE, ANNE BOURDON, PASCAL CHABERT, Laboratoire de Physique des Plasmas, DENIS EREMIN, Ruhr-Universitt, LAURENT GARRIGUES, LAPLACE, KEN HARA, Texas AM University, TASMAN POWIS, Princeton University, ANDREI SMOLYAKOV, DMYTRO SYDORENKO, University of Saskatchewan, ANTOINE TAVANT, Laboratoire de Physique des Plasmas, WILLCA VILLAFANA, CERFACS — In applications such as ion sources or plasma processing, the gas pressure is relatively low and plasma confinement by a magnetic field is required. We call these plasmas partially magnetized plasmas because electrons are strongly magnetized, while ions are not. The magnetic field can be responsible for a variety of instabilities that are difficult to describe quantitatively. A kinetic description is needed to understand these instabilities but prior to use a Particle-In-Cell (PIC) code extensively, it is important to be sure of its correctness. Unit tests can be used to verify specific modules and benchmarks can be defined in a more global approach, such as the 1D Helium benchmark of Turner et al, in which 5 independent PIC codes were giving similar results. However, we needed here a simulation case that was closer to the complex physics of an ExB discharge. A 2D axial-azimuthal simulation case was chosen and the results of 7 independent PIC codes have been compared extensively (mean parameters and instabilities characteristics). A particular focus has been made on the dependance on number of particles per cell, as it has been recently shown to influence numerical results.

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