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2D axial-azimuthal Particle-In-Cell benchmark for low-temperature partially magnetized plasmas T. CHAROY, LPP, Ecole Polytechnique, J.P. BOEUF, LAPLACE, Universite de Toulouse, A. BOURDON, LPP, Ecole Polytechnique, J.A. CARLSSON, RadiaSoft LLC, Boulder, CO, P. CHABERT, LPP, Ecole Polytechnique, B. CUENOT, CERFACS 42, D. EREMIN, Ruhr University Bochum, L. GARRIGUES, LAPLACE, Universite de Toulouse, K. HARA, Texas AM University, I.D. KAGANOVICH, Princeton Plasma Physics Laboratory, A.T. POWIS, Princeton University, A. SMOLYAKOV, University of Saskatchewan, D. SYDORENKO, University of Saskatchewan/University of Alberta, A. TAVANT, LPP, Ecole Polytechnique/Safran Aircraft Engines, O. O. VERMOREL, CERFACS 42, W. VILLAFANA, CERFACS- 42/Safran Aircraft Engines
— Representative simulation case to study low-temperature partially-magnetized plasmas is defined. Seven independently developed Particle-In-Cell codes have simulated this benchmark case, with the same specified conditions. The characteristics of the codes used, implementation details or computing times and resources, are given. We compare the steady-state the time-averaged axial profiles of 3 main discharge parameters (axial electric field, ion density and electron temperature). We show that the results obtained exhibit a very good agreement within 5% between all the codes. An analysis of the instabilities propagating in the direction of electron drift is performed and a similar behaviour is retrieved between all the codes. A particular attention has been paid to the numerical convergence by varying the number of particles per cell; it is shown that this benchmark case displays a good convergence.

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