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Implementation of a 3D version of ponderomotive guiding center solver in particle-in-cell code OSIRIS ANTON HELM, JORGE VIEIRA, LUIS SILVA, GoLP/IPFN Instituto Superior Tcnico, Universidade de Lisboa, Lisboa, Portugal, RICARDO FONSECA, Instituto Universitrio de Lisboa (ISCTE-IUL), Lisboa, Portugal — Laser-driven accelerators gained an increased attention over the past decades. Typical modeling techniques for laser wakefield acceleration (LWFA) are based on particle-in-cell (PIC) simulations. PIC simulations, however, are very computationally expensive due to the disparity of the relevant scales ranging from the laser wavelength, in the micrometer range, to the acceleration length, currently beyond the ten centimeter range. To minimize the gap between these despair scales the ponderomotive guiding center (PGC) algorithm [1, 2] is a promising approach. By describing the evolution of the laser pulse envelope separately, only the scales larger than the plasma wavelength are required to be resolved in the PGC algorithm, leading to speedups in several orders of magnitude. Previous work was limited to two dimensions [3]. Here we present the implementation of the 3D version of a PGC solver into the massively parallel, fully relativistic PIC code OSIRIS [4]. We extended the solver to include periodic boundary conditions and parallelization in all spatial dimensions. We present benchmarks for distributed and shared memory parallelization. We also discuss the stability of the PGC solver. [1] P. Mora and T.M. Antonsen, Phys. Rev. E 53, R2068 (1996) [2] P. Mora and T.M. Antonsen, Phys. Plasmas 4, 217 (1997) [3] D.F. Gordon et al., IEEE Trans. Plasma Sci. 28, 1224 (2000) [4] R.A. Fonseca et al., Lect. Notes Comput. Sci. 2331, 342 (2002)

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