

Abstract Submitted
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CPIC: a curvilinear Particle-In-Cell code for plasma-material interaction studies GIAN LUCA DELZANNO, ENRICO CAMPOREALE, J. DAVID MOULTON, JOSEPH BOROVSKY, ELIZABETH MACDONALD, MICHELLE THOMSEN, LANL — We present a recently developed Particle-In-Cell (PIC) code in curvilinear geometry called CPIC (Curvilinear PIC) [1], where the standard PIC algorithm is coupled with a grid generation/adaptation strategy. Through the grid generator, which maps the physical domain to a logical domain where the grid is uniform and Cartesian, the code can simulate domains of arbitrary complexity, including the interaction of complex objects with a plasma. At present the code is electrostatic and Poisson’s equation is solved with a scalable multigrid method. CPIC also features a hybrid particle mover, where the computational particles are characterized by position in logical space and velocity in physical space. We will present our latest progress on the development of the code and document the code performance (in terms of solver and with a comparison of the hybrid mover relative to a conventional physical space mover) on standard plasma-physics tests.

[1] G.L. Delzanno, E. Camporeale, et al., “CPIC: a curvilinear Particle-In-Cell code for spacecraft-plasma interaction studies,” Proceedings of the 12st Spacecraft Charging and Technology conference, 2012.

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