

Fully implicit particle in cell algorithm for electromagnetic plasma simulations

Luis Chacon

We extend recent developments on energy and charge conserving implicit electrostatic particle-in-cell algorithms to the electromagnetic regime. We base our implementation on a Darwin model, which avoids numerical Cherenkov radiation while remaining exactly energy conserving. In reduced dimensionality, we are also able to enforce exact conservation of canonical momenta by an appropriate scattering rule for the magnetic field to the particles. In this talk, we introduce the algorithm, and will demonstrate its properties with challenging numerical experiments.