Abstract Submitted
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Algorithm implementation and testing to ensure consistency of Gausss law in OSIRIS[1] KYLE MILLER, Univ of California - Los Angeles, PAUL ELIAS, Office National d'Etudes et Recherches Aerospatiales, RICARDO FONSECA, Instituto Superior Tecnico, BENJAMIN WINJUM, FRANK TSUNG, VIKTOR DECYK, WARREN MORI, Univ of California - Los Angeles — Electromagnetic particle-in-cell (PIC) simulations compute the trajectories of particles as they interact via fields calculated by numerically solving Maxwell's equations on a grid using currents (and charge densities) from the particles. Within PICKSC, UCLA maintains a variety of open-source and open-access codes. These include OSIRIS—developed in partnership with IST—and UPIC-EMMA. Standard OSIRIS uses a rigorous charge-conserving current deposit to ensure the consistency of Gauss's law together with a finite-difference (FD) solution to Maxwell's equations. It also contains options for spectral (FFT) and hybrid (FFT and FD) field solvers, as well as a customized, higher-order FD field solver to help mitigate the numerical Cerenkov instability. The standard charge conserving current deposit is only valid for second-order accurate FD solvers. Another option for maintaining the consistency of Gauss's law is the Boris correction, where a "direct" current deposit is used and the electric field is corrected through the use of a Poisson solve. The Boris correction—with both exact and iterative multigrid Poisson solves—has been implemented into OSIRIS. Preliminary analyses of timing and fluctuations levels will be presented, including the effects of different particle orders.

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