Abstract Submitted
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New methods for suppressing numerical Cherenkov instabilities in relativistic particle-in-cell simulations[1] YINGCHAO LU, Los Alamos National Laboratory and Rice University, PATRICK KILIAN, CHENGKUN HUANG, FAN GUO, HUI LI, Los Alamos National Laboratory, EDISON LIANG, Rice University — We present two novel methods for suppressing numerical Cherenkov instabilities in relativistic particle-in-cell simulations The WT scheme, a piecewise polynomial force interpolation scheme with time-step dependency, is proposed to remove the lowest order numerical Cherenkov instability (NCI) growth rate for arbitrary time steps allowed by the Courant condition. While NCI from higher order resonances is still present, the numerical tests show that for smaller time steps, the numerical instability grows much slower than using the optimal time step found in previous studies. _A semi-implicit Maxwell solver derived from finite element method with O(N) computing cost is developed to improve the numerical dispersion properties

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