Abstract Submitted
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A Lorentz ion/drift-kinetic electron model for particle-in-cell turbulence simulations in tokamaks YANG CHEN, SCOTT PARKER, BENJAMIN STURDEVANT, University of Colorado at Boulder — The gyrokinetic model faces a few limitations when applied to tokamak plasmas. First, in the steep gradient edge pedestal, the equilibrium scale lengths for the density and temperature profiles are on the scale of 10 ρ_i or even shorter, which makes the small ρ_i/L_n ordering inaccurate. Second, the presence of a sonic level ExB flow complicates the gyrokinetic formalism. Third, the long wavelength radial electric field requires equations derived and implemented to higher order accuracy.[1] For these reasons we have previously proposed a Lorentz ion/drift-kinetic electron model.[2] This model is unlikely to solve all the problems gyrokinetics faces, but will provide an independent tool for verification. Here we consider the implementation of the model in toroidal geometry, with the goal of laying out a detailed plan of implementation. This includes the choice of a suitable coordinate system, the discretization of the field equations (the three components of a generalized Ohm's law) and parallelization. Integration techniques of the Lorentz ions, including subcycling and orbit averaging, will be discussed.

[1]F. Parra and P. Catto, Plasma Phys. Contr. Fusion 50, 065014 (2008)
[2]Y. Chen and S. E. Parker, Phys. Plasmas 16, 052305 (2009)

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