Abstract Submitted
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Gyrokinetic simulation of the collisionless tearing mode instability[1] EDWARD STARTSEV, WEI-LI LEE, PPPL — A recently developed split-weight perturbative particle simulation scheme for finite-β plasmas in the presence of background inhomogeneities [1] has been generalized to the sheared magnetic field geometry. The scheme is an improvement over the original split-weight scheme [2], which splits the perturbed particle response into adiabatic and non-adiabatic parts. In the new scheme, the additional adiabatic response of the particles associated with the quasi-static bending of the magnetic field lines in the presence of background inhomogeneities of the plasma is analytically separated. The new scheme has been implemented in a 2D particle-in-cell code in slab geometry with drift-kinetic electrons and gyrokinetic ions. In this paper the results of linear simulations of tearing mode for realistic mass ratio $m_i/m_e = 1837$ and different values of plasma β are presented and compared to the solution of the eigenvalue equation. The unstable mode structure has double-peaked shape corresponding to the positive tearing mode parameter Δ' consistent with the MHD requirement for the tearing mode instability [3].

[1] E. A. Startsev et. al, submitted to Phys. Plasmas, (2013).
[2] W. W. Lee et. al, Phys. Plasmas 8, 4435 (2001).
[3] H. P. Furth et. al., Phys. Fluids 6, 459 (1963)

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