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Electromagnetic gyrokinetic simulation in GTS[1] C.H. MA, E.A. STARTSEV, W.X. WANG, P. PORAZIK, M.G. YOO, J. CHEN, S. ETHIER, Princeton Plasma Physics Laboratory — We report on the recent developments in the electromagnetic simulation capability for general toroidal geometry based on the global particle-in-cell gyrokinetic code GTS. Due to the cancellation problem, gyrokinetic simulations with electromagnetic perturbations run into numerical difficulties in the MHD limit where the plasma beta is larger than the mass ratio. We utilize a modified $p_{\|}$ formulation with a time integral of $E_{\|}$ in place of $A_{\|}$ [Mishchenko, PoP (2014)]. The time integral of $E_{\|}$ is solved directly using Ampere's Law. Since the original Mishchenko scheme can suffer from the effects of numerical noise due to particle discreteness, we have devised a new noise correcting scheme that removes particle noise from both the electron density and electron current. This is essentially a higher order extension of Chens noise reduction scheme [Chen, JCP (2003)]. With the new scheme our simulations correctly reproduce the finite beta stabilization effect of ITG and the onset of KBM for the Cyclone Base Case parameters. Our algorithm is extended for nonlinear simulation. Preliminary nonlinear simulation results will also be presented.

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