Abstract Submitted
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Verification of fluid type electromagnetic modes with a gyrokinetic-fluid hybrid model in the XGC code[1] ROBERT HAGER, PPPL, J. LANG, Intel Corporation, P. PORAZIK, C.S. CHANG, S. KU, J. DOMINSKI, PPPL, Y. CHEN, S. E. PARKER, U. Colorado, M. F. ADAMS, LBL — As an alternative option to kinetic electrons, the gyrokinetic total-f particle-in-cell (PIC) code XGC1 has been extended to the MHD/fluid type electromagnetic regime by combining gyrokinetic PIC ions with massless drift-fluid electrons analogous to Chen and Parker [Phys. Plasmas 8, 441(2001)]. This work complements - as a more economical alternative - the fully kinetic electromagnetic formulation that is also being developed for XGC1 [S. Ku, APS-DPP 2016; J. Chowdhury, APS-DPP 2017]. Two representative long wavelength modes, shear Alfvn waves and resistive tearing modes are verified in cylindrical and toroidal magnetic field geometries. In addition, results for intermediate wavelength drift-Alfvn waves such as ion temperature gradient driven modes, peeling modes, and kinetic ballooning modes are also presented. We plan to apply XGC1 to study the stability of resistive tearing modes in NSTX. These studies are the groundwork for the extension of the current delta-f hybrid model to the total-f method required to study fluid type electromagnetic modes in the tokamak edge plasma and develop a better understanding of the onset of edge localized modes.

[1]Computing time from NERSC

Robert Hager
PPPL

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