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Compressional Magnetic Fluctuations in Global Gyrokinetics[1]
SHU-WEI TSAO, M.J. PUESCHEL, ANNA TENERANI, DAVID HATCH, University of Texas at Austin — Compressional magnetic field fluctuations are commonly ignored in gyrokinetic simulations. They tend not to have a large effect in core fusion plasmas, but may affect electromagnetic modes in the tokamak pedestal, the reconnection physics active in the solar corona, or the LAPD high-β experiments. [Pueschel et al., PoP 22, 062105 (2015)]. The radially global gyrokinetic framework including compressional fluctuations is derived. Its implementation in the gyrokinetic turbulence code GENE is then compared against local flux-tube scenarios of a standard tokamak benchmark case, at LAPD high-β experimental parameters, and for magnetic reconnection in 3D coronal loop geometry. Due to the usage of finite-element radial base function, the magnetic potential in the two directions perpendicular to the background magnetic field should be computed separately. This decouples the $B_\parallel$ from its gyroaveraged quantity $\bar{B}_\parallel$, thus a new gyroaverage procedure for the compressional magnetic field is also implemented.

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