GTC full torus electromagnetic gyrokinetic particle simulations with kinetic electrons

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The fluid-kinetic electron hybrid model for simulations of the electromagnetic turbulence in magnetized plasmas is extended to treat zonal flows and zonal fields in the toroidal geometry for fusion applications. The full torus electromagnetic gyrokinetic particle simulations using the hybrid model with kinetic electrons in the presence of magnetic shear is presented. The fluid-kinetic electron hybrid model employed in this paper improves numerical properties by removing the tearing mode while preserving both linear and nonlinear wave-particle resonances of electrons with Alfven wave and ion acoustic wave.

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