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Global Gyrokinetic Particle Simulations of Electromagnetic Drift-Wave Turbulence and Transport[1] IHOR HOLOD, University of California, Irvine — Gyrokinetic simulation of the finite-β drift-wave microturbulence in global tokamak geometry, using GTC code, has been reported. In the GTC the electron dynamics is treated using the fluid-kinetic hybrid electron model developed to enhance numerical efficiency. In this model, the electron response is separated into the lowest order adiabatic part, treated as a massless fluid, and the high-order kinetic correction described by the drift-kinetic equation. The fluid-kinetic hybrid electron model is verified by running linear simulations using Cyclone base case parameters with different values of β_e (ratio of electron kinetic pressure to magnetic pressure), obtained by varying the equilibrium electron density. The dependence of mode real frequency and linear growth rate on β_e recovers the effect of β-stabilization of the ion-temperature gradient mode, transition to the trapped electron mode and the onset of the kinetic-ballooning mode. The nonlinear simulations address the effect of zonal flow and zonal current on mode saturation amplitude, and heat transport properties.

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