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Global Gyrokinetic Simulations of Toroidal Momentum Transport in Tokamak Plasmas IHOR HOLOD, University of California Irvine — Global gyrokinetic simulations of toroidal momentum transport in turbulent plasmas are performed, using the nonlinear gyrokinetic particle-in-cell code GTC. The momentum transport is driven by the ITG turbulence. The equilibrium plasma rotation is described by shifted Maxwellian parallel velocity distribution for ions. Cases with constant (rigid rotation) and radially sheared angular velocity are considered. The temporal evolution together with the radial profiles of flux surface averaged toroidal momentum and momentum flux are obtained from the simulation. We observe a significant redistribution of toroidal momentum during the ITG instability development and after the nonlinear saturation. The general trend of spinning up of plasma towards a center of tokamak is observed for the rigid rotation cases, which is the manifestation of the off-diagonal (pinch-like) inward flux. For the sheared rotation cases, the competition between diffusive and off-diagonal fluxes takes place. In order to determine toroidal momentum diffusivity we have separated diagonal flux by subtracting the off-diagonal contribution obtained from the corresponding parameter scan. The obtained toroidal momentum conductivity is compared with the ion heat conductivity, giving the ratio in the range 0.3-0.7. This ratio is confirmed by quasilinear estimates based on the obtained fluctuation spectra. The work was supported by SciDAC GPS Center.

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