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Global Gyrokinetic Simulations of Toroidal Momentum Transport[1] I. HOLOD, Z. LIN, UCI — Global gyrokinetic simulations of toroidal momentum transport are performed, using the nonlinear gyrokinetic particle-in-cell code GTC. The total momentum flux can be presented as a sum of diffusive and residual stress fluxes. To identify these components we have considered cases with constant and radially sheared angular velocity. In the presence of ITG turbulence, the inward flux of momentum is observed for the rigid rotation cases. This flux is proportional to background velocity and can be identified as a momentum pinch. For the sheared rotation cases, the competition between diffusive and off-diagonal fluxes takes place. The intrinsic Prandtl number is found to be in the range Pr=0.2-0.7, which is consistent with quasilinear estimates based on the obtained fluctuation spectra. We have shown that Pr<1 is due to the fact that resonant energy is typically larger than thermal energy. The effect of kinetic electrons is studied in both CTEM and ITG plasma turbulences. The off-diagonal momentum flux under CTEM turbulence shows qualitative difference compare to ITG case; in particular it weakly depends on background plasma rotation or its gradient, and thus can be treated as a residual stress flux. In case of ITG turbulence we observe the enhancement of momentum flux, compare to the case with adiabatic electrons.

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