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Gyrokinetic simulation of toroidal momentum transport in ITG and CTEM turbulence[1] IHOR HOLOD, ZHIHONG LIN, UCI — Studies of kinetic electrons effect in the toroidal momentum transport in the ITG turbulence and pioneering global nonlinear gyrokinetic simulations of momentum transport in CTEM turbulence using GTC are presented. The distinct off-diagonal momentum fluxes are observed. Varying the background rotation speed, the toroidal momentum pinch velocity and residual momentum flux is calculated, and used to separate the diffusive momentum flux and to calculate the intrinsic Prandtl number for the first time. The obtained values for ITG and CTEM turbulence are found to be from Pr=0.3 to Pr=0.9, which is consistent with experimental observations and quasilinear estimates. The effect of kinetic electrons leads to the increase of momentum flux in the ITG turbulence. The convective particle flux in this case gives relatively small contribution to the total momentum pinch. In CTEM turbulence particle convection gives significant contribution to the momentum pinch, although the total momentum pinch is relatively small. The volume-averaged residual momentum flux in CTEM turbulence is found to be insignificant. While the diagonal and off-diagonal fluxes are comparable in the ITG turbulence, the dominant contribution to the momentum flux in CTEM case comes from the diffusive term.

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