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Theory and Simulation of Toroidal Momentum Transport[1] T.S. HAHM, W. WANG, Princeton University, P.H. DIAMOND, O. GURCAN, Univ. of California, San Diego, G. REWOLDT, Princeton University — By constructing a radial flux of toroidal angular momentum from the "energy conserving" nonlinear gyrokinetic equation in toroidal geometry [1], we can readily identify a diffusive flux and a non-diffusive flux. For the diffusive flux from ITG turbulence, it has been shown that $\chi_\phi \sim \chi_i$ [2] in rough agreement with observations from NBI-heated plasmas. We've investigated possible physical mechanisms behind the nondiffusive flux, and found that: Mean $\mathbf{E} \times \mathbf{B}$ shear can induce a net momentum flux by breaking the quasi- translational invariance of the ballooning eigenfunctions. Results from the FULL code demonstrate such modifications of eigenmodes. However, $\mathbf{E} \times \mathbf{B}$ shear suppression makes resulting parallel flow weak. New nonlinear simulation results from GTC code including plasma shaping will be reported [3].

[1] T.S. Hahm, Phys. Fluids **31**, 2670 (1988).
[2] N. Mattor and P.H. Diamond, Phys. Fluids **31**, 1180 (1988).
[3] W.X. Wang *et al.,* Submitted to Phys. Plasmas (2006).

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