Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Gyrokinetic Theory and Simulation of Angular Momentum Transport[1] R.E. WALTZ, G.M. STAEBLER, J. CANDY, F.L. HINTON, General Atomics — A gyrokinetic theory of turbulent toroidal angular momentum transport as well as modifications to neoclassical poloidal rotation from turbulence is formulated starting from the fundamental six-dimensional kinetic equation. GyroBohm-scaled transport is evaluated from toroidal gyrokinetic simulations using the GYRO code [1]. The simulations quantify the two pinch mechanisms in the radial transport of toroidal angular momentum: the slab geometry ExB shear pinch [2] and the toroidal geometry "coriolis" pinch due to finite parallel velocity [3]. The pinches allow the steady-state null stress (momentum transport) condition required for intrinsic toroidal rotation in heated tokamaks without an internal source of torque [4]. A predicted turbulent shift in the neoclassical poloidal rotation [5] may be significant.

[1] J. Candy and R.E. Waltz, J. Comp. Phys. **186**, 545 (2003).
[2] R.R. Dominguez and G.M. Staebler, Phys. Fluids **B5**, 387 (1993).
[3] A.G. Peeters, et al., Phys. Rev. Lett. **98**, 26503 (2007).
[4] G.M. Staebler, et al., Bull. Am. Phys. Soc. **46**, 221 (2001).
[5] G.M. Staebler, Phys. Plasmas **11**, 1064 (2004).

[1]Supported by US DOE under DE-FG03-95ER54309.

G.M. Staebler
General Atomics

Date submitted: 22 Jul 2007 Electronic form version 1.4