Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Quantitative Studies of Nonlinear Interactions Between Shear Flows and Turbulence in Experiment and Simulation[1] C. HOLLAND, G.R. TYNAN, University of California-San Diego, R.J. FONCK, G.R. MCKEE, U. Wisconsin-Madison, R.E. WALTZ, J. CANDY, General Atomics — Using newly developed analysis algorithms, we present the first direct experimental measurements of the nonlinear shearing of drift-wave turbulence by a geodesic acoustic mode (GAM, a finite-frequency zonal flow). Density fluctuation measurements obtained via beam emission spectroscopy are combined with a velocity inference algorithm to provide a direct measurement of the shearing action. The measurements indicate that the shearing leads to a transfer of internal energy to smaller scales, in agreement with expectations from theory and simulation. To provide better context for these results, simulations from the GYRO gyrokinetic code are used to quantify the relative importance of zonal flow shearing vs. "self-shearing" of drift-waves, and differences in turbulence shearing by "Rosenbluth-Hinton" zonal flows with zero mean frequency and finite-frequency GAMs. The implications of strong GAM shearing in the tokamak edge are also discussed.

[1]Work supported by US DOE under DE-FG02-04ER54758, DE-FG03-96ER54373, and DE-FG03-95ER54309.

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Date submitted: 24 Jul 2005 Electronic form version 1.4