Abstract Submitted for the 54th Annual Meeting
Division of Plasma Physics
Oct.29 –Nov.2, 2012, Providence, Rhode Island

Category Number and Subject: 5.6.2. DIII-D Tokamak

[ ] Theory [X] Experiment

The Dynamics of Turbulence and Flow During the L-H Transition,* Z. Yan, G.R. McKee, *University Wisc*onsin-*Madison*; J.A. Boedo, D.L. Rudakov, G.R. Tynan, P.H. Diamond, *University of California San Diego*; R.J. Groebner, T.H. Osborne, *General Atomics*; G. Wang, L. Schmitz, *University of California Los Angeles* — Comprehensive 2D turbulence and flow measurements are obtained before, during and after the L-H transition. An ion gyro-radius and density scan was performed on DIII-D to investigate the physics of the L-H transition and the threshold dependence on B_T and n_e. The amplitude of long wavelength density fluctuations scale approximately with ρ*. Stronger poloidal turbulence flow shear is found at low density. The poloidal turbulence velocity spectrum changes from GAM at ~300 ms before the L-H transition to zonal flows near the transition. About 100 μs before the transition, the Reynolds stress gradient, inferred from 2D BES velocimetry, increases rapidly. The poloidal velocity and shear likewise peak near the same time, consistent with the prediction that Reynolds stress drives a zonal flow that triggers the L-H. The turbulence and shear dynamics leading to a typical L-H transition will also be compared with limit-cycle-oscillations between L- and H-modes observed under certain discharge conditions.

*Work supported by the US Department of Energy under DE-FG02-08ER54999, DE-FG02-89ER53296, DE-FG02-07ER54917, DE-FC02-04ER54698 and DE-FG03-08ER54984.