Observations of highly sheared turbulence in the H-mode pedestal using Phase Contrast Imaging on DIII-D

J.C. ROST, A. MARI-NONI, E.M. DAVIS, M. PORKOLAB, MIT, K.H BURRELL, GA — Highly sheared turbulence with short radial correlation lengths has been measured near the top of the H-mode pedestal, in addition to the previously measured highly-sheared turbulence measured in the $E_r$ well. Turbulence in regions of large velocity shear is characterized by radial correlation lengths shorter than the poloidal wavelength ($L < \lambda \sim 2$ cm) and large Doppler-shifted frequencies ($f > 200$ kHz). The phase contrast imaging (PCI) diagnostic on DIII-D is ideally suited to measuring this density turbulence due to the measurement geometry and high frequency bandwidth. Radial localization is achieved by optical filtering, varying the ExB profile, and shifting the plasma position. Reconfiguration of the $E_r$ well, such as at the L-H transition or the transition to wide pedestal QH-mode, shows a near-instantaneous change ($t < 1$ ms) to the sheared turbulence in the $E_r$ well ($\sim 1$ cm inside the separatrix). In contrast, the sheared turbulence near the top of the pedestal ($\sim 2$ cm inside the separatrix) varies over times scales of tens of ms, consistent with pedestal evolution.

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