Edge turbulence and SOL blobs in the National Spherical Torus Experiment (NSTX)*

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Edge turbulence and intermittent filamentary structures, also known as blobs, are routinely seen in the low field side scrape-off layer (SOL) of NSTX using Gas Puff Imaging (GPI). These have similar characteristics to those observed in other toroidally confined experiments. In NSTX the contribution of turbulence and blobs to cross-field energy transport and SOL width is being studied by comparing the experimental results with those of the 2-D fluid turbulence SOLT code. This code uses time averaged profiles from the experiment and yields results directly comparable to the data through a *synthetic* GPI diagnostic.

Using the GPI diagnostic 2-D edge imaging has now been done at 285,000 frames/s for ±30 ms around the L-H transition. The main L-H transition is seen as a sharp reduction in edge/SOL turbulence over ~100 μs, but this is preceded by 'quiet periods' with a frequency of ~3 kHz for at least 20 ms. During these periods of reduced turbulence the poloidal flow tends to reverse direction. These results will be compared to calculations of the GAM frequency using two-fluid code NLET and the gyrokinetic codes GYRO and GS2. The wavelet bicoherence will also be calculated for this data to evaluate the nonlinear coupling between the turbulence spectrum and these quiet periods.

Fine structured, intermittent filaments are also seen on the lower divertor target plates of NSTX. These filaments correspond to the interaction with the target plates of the turbulent blobs seen near the midplane with GPI, showing very good correlation between both observations. The correlation is lost close to the outer strike point, consistent with the existence of 'magnetic shear disconnection' due to the lower X-point as proposed by Cohen and Ryutov [Nucl. Fusion **37**, 621 (1997)].

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