

Blob physics and analysis from Gas Puff Imaging in the National Spherical Torus Experiment (NSTX)

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Filamentary structures, or ‘blobs’, are measured in the edge of the National Spherical Torus Experiment (NSTX) using the Gas Puff Imaging (GPI) diagnostic. These blobs are observed to be born from edge turbulence which is, in turn, most likely due to drift wave and/or curvature-driven instabilities. In general, in NSTX, both turbulence and blobs are substantially reduced during H-mode respect to the Ohmic or L-mode (lower confinement) regimes. The characteristics of the H-mode turbulence and blobs in NSTX present a continuum from a turbulence level just above that measurable (a “quiescent” H-mode) to that approaching L-mode level (an “active” H-mode), at least for brief periods of time. The most significant change in the turbulence from L-mode to H-mode is a decrease in the fluctuations in the poloidal velocity of the turbulence, as if the flow was more ‘frozen’ in H-mode. The radial and poloidal correlation lengths of the turbulence are not significantly different between L-mode and H-mode. Bicoherence analysis indicates that during the L-H transitions the turbulence is not coupling to poloidal flows in the edge of NSTX at least in the region across the separatrix and just above the outer midplane where the GPI diagnostic is located.

This work was supported by U.S. D.O.E. Contract Nos. DE-FG02-04ER54520, DE-AC02-76CH03073 and DE-FG02-02ER54678.