

Abstract for an Invited Paper
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Structure and Motion of Edge Turbulence in NSTX and Alcator C-Mod

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This talk will describe recent 2-D imaging measurements of edge turbulence in NSTX and present some comparisons with Alcator C-Mod and with theory and simulation. The measurements were made using the visible line emission from localized neutral deuterium or helium gas puffs [1-3]. Ultra-high speed movies of the turbulent structure and motion of this light emission were made in both NSTX and C-Mod with a spatial resolution of 64 pixels (poloidally) x 64 pixels (radially), with 300 time frames at 250,000 frames/sec. In Ohmic and L-mode plasmas the edge is always highly turbulent and often contains localized structures (“blobs”) which move at about 1 km/sec both radially and poloidally. A model has been developed to convert the local light emission to density and temperature for comparisons of the observed blob motion in NSTX with analytic scalings [4] and 2D simulations. Movies of the L-H transition in NSTX will be presented and analyzed; the transition evolves from a turbulent state to a more quiescent state without much apparent change in the local turbulence flows. Additional NSTX phenomena will be shown if time allows (e.g. ELMs, MHD, etc.). The imaging results in NSTX will be compared with those in C-Mod and with turbulence simulations where possible. Opportunities for additional comparisons between experiment and theory will be discussed.

[1] S.J. Zweben et al, Nucl. Fus. 44, 134, 2004

[2] R.J. Maqueda et al, Rev. Sci. Inst. 74, 2020, 2003

[3] J.L. Terry et al, Phys. Plasmas 10, 1739, 2003

[4] J.R. Myra and D.A. D'Ippolito, Lodestar Report #LRC-05-105 (2005).

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