Correlations of Signals of Neutral Particle Analyzer Diagnostics with Instability Bursts

D. Liu, W. W. Heidbrink
University of California at Irvine, Irvine, CA 92697

E. D. Fredrickson and S. S. Medley
Princeton Plasma Physics Laboratory, Princeton, NJ 08543

The extensive set of fast-ion diagnostics (neutron detectors, E||B-type neutral particle analyzer (NPA), solid state neutral particle analyzer (SSNPA) array with tangential radii of 60, 90,100,120 cm) on National Spherical Torus Experiment (NSTX) provides a good test-bed for the study if fast ion confinement. A cross-correlation analysis has been performed on the NSTX 2007 campaign data to detect the correlation between NPA/SSNPA signals and instability bursts. It is shown that fishbones often cause bursts at some tangential radii of NPA/SSNPA during large events, which indicates fast ion loss. More importantly, high energy channels respond firstly and then low energy channels. It is also observed that avalanches always cause bursts at some chords of SSNPA. Examples of experimental data will be presented along with physical explanations.