

Measurement of the fluctuations and ELMs using fast camera in NSTX

Subject area: A.5

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A divertor fast camera is used to measure the peripheral fluctuations and ELMs in NSTX plasma. The tangential view of the fast camera was proposed by one of the authors (N.N.) under US-JAPAN collaborative activity. The fast camera (Photron Ultima-SE) has capability of up to 40500 frames per second (FPS). Occasionally the second high-speed camera (Photron APX) was used to measure the center stack region in double null (DN) plasma. The APX has capability of up to 120000 FPS.

As in conventional aspect ratio tokamaks, NSTX observes a variety of edge localized modes (ELMs) in H-mode; Type I, III, and new type V are observed in typical lower single null (LSN) configurations. Moreover recently NSTX observes other type ELMs in center stack region in DN plasmas. This is quite interesting because this ELM moves up and down through the strongest magnetic field region. There is no theory about this center stack ELMs. Therefore, we labeled this Type VI. During Type V and VI ELMs the stored energy does not decrease. The physics of new ELMs (labeled V and VI) is unclear.

With the divertor tangential view the behavior of the peripheral fluctuations in outer region is independent of that of the fluctuations in the private region. Therefore, the separatrix can usually separate both fluctuations. The filament labeled by one of the authors (S.J.Zweben) in TFTR is usually observed in L-mode. However there is some structure of fluctuations in H-mode.