

Intermittent fluctuations in the Alcator C-Mod

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In the far scrape-off layer (SOL), radial motion of filamentary structures leads to excess transport of particles and heat. Single point dwell probe measurements from the SOL of several tokamaks [1, 2, 3] reveal order unity relative fluctuations with positively skewed histograms with exponential tails towards high amplitudes. Conditional averaging of fluctuations reveal the large-amplitude bursts to have two-sided exponential structures, with a sharp rise and trailing wake. This is consistent with the power spectral density and autocorrelation function of the time series.

Investigations of SOL fluctuations in the Alcator C-Mod using both the mirror Langmuir probe (MLP) [4] and gas puff imaging (GPI) [5] conform well to these general results. However, there are discrepancies: the MLP time series generally has lower fluctuation levels and larger filament width than those taken with GPI. In this contribution, we investigate measurements taken with a conventional Langmuir probe using both the well known techniques listed above as well as a new deconvolution method for unambiguously revealing filament arrival times and amplitudes [6].

With measurements from plasmas with different parameters as well as in both upper and lower single null configurations, the Langmuir probe data set is well suited to address this discrepancy and reveal universality in the behavior of SOL fluctuations.

References

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