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Exponential Spectra in Alcator C-Mod Edge Turbulence[1] VICTORIA WINTERS, ANNE WHITE, MIT-PSFC, DAVID PACE, General Atomics, JIM TERRY, ARTURO DOMINGUEZ, FELIX PARRA, JERRY HUGHES, MIT-PSFC
— It has been proposed that exponential power spectra seen in edge turbulence of fusion plasmas is the result of deterministic chaos, and is associated with the presence of Lorentzian pulses in the time series data. Using reflectometer and Gas Puff Imaging (GPI) data in the Alcator C-Mod tokamak, we have analyzed exponential power spectra in Ohmic and L-mode plasmas. Both reflectometer homodyne signals and GPI signals measuring density fluctuations just inside or at the Last Closed Flux Surface (LCFS) exhibit exponential power spectra. Theoretically, the characteristic slope of the data on a semi-log plot gives the full width of the underlying Lorentzian pulses. Using a separate fitting routine, individual Lorentzian pulses in the reflectometer time series data have been identified. Preliminary results show that the widths of the Lorentzian pulses match the inverse characteristic frequency of the exponential spectra By using data from variety of different shots we find that the characteristic frequency of the exponential spectrum of the reflectometer homodyne signals varies depending on plasma parameters. Initial results show that characteristic frequency increases with increasing line-averaged plasma density. Other plasma parameter dependencies are being conducted currently.

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Victoria Winters
MIT-PSFC

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