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Complex Dynamics Analysis of Fluctuation Reflectometry Data from the DIII-D Tokamak[1] M. GILMORE, T.L. RHODES, W.A. PEEBLES, Electrical Engineering Dept, University of California, Los Angeles, C.X. YU, Dept of Modern Physics, University of Science and Technology of China — Both SOC-based and standard turbulence-based models have predicted the existence of complex dynamical behavior, such as long-range correlations, that may have a significant impact on cross-field transport in magnetically confined plasmas. A number of analysis techniques and parameters can be used to quantify the complex dynamics of a turbulent system, including spectral techniques, cross-correlations, the Hurst parameter, and the intermittency parameter. These techniques have been applied to turbulence data from the DIII-D tokamak, measured by reflectometry, both in plasmas with transport barriers as well as those without transport barriers. Core fluctuations are found to exhibit self-similarity, long-range correlations, and intermittency. Hurst parameters near 0.5, indicating a reduction of long-range correlations, are observed just inside the separatrix in H-mode (in the sheared flow layer), as well as in ohmic and L-mode discharges.

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