Abstract Submitted
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Evolution of Turbulence in High Temperature Plasmas[1] JAMES B. TITUS, ALONZO B. ALEXANDER, EPHREM MEZONLIN, Florida A&M University, ABDULGADER ALMAGRI, University of Wisconsin - Madison, MADISON SYMMETRIC TORUS COLLABORATION — Turbulence measurements have been made in high temperature plasma in the Madison Symmetric Torus (MST) at the University of Wisconsin–Madison. Techniques from Fourier analysis and chaos theory are used to characterize magnetic turbulence in different plasma regimes, including magnetic reconnection and increased confinement. The Fourier components measure: the driving wavenumbers associated with instabilities, the amount of energy in different scales, and the rate at which that energy moves between scales. The chaos components measure the complexity of the fluctuations. More specifically, the Beta model for intermittency in 3D turbulence suggests that the fractal dimension, needed to account for non-space filling, can modify Kolmogorov's 5/3 Law. The correlation dimension is used to estimate the fractal dimension during the evolution of different plasma events. During magnetic reconnection, it has been seen that as the magnetic energy decreases during a sawtooth crash, the energy in the ion-cyclotron frequency range (or dissipation region) increases and the fractal dimension sharply peaks. This suggests that complexity may play a role during the redistribution of energy through turbulence. These techniques will be the stepping-stones for turbulence studies at the Spheromak Turbulent Physics Experiment (STPX) at Florida A&M University.

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