

Abstract Submitted
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Parametric investigation of compressional and global Alfvén eigenmode instability and effect on thermal confinement in NSTX-U¹
S. TANG, N.A. CROCKER, T.A. CARTER, UCLA, E.D. FREDRICKSON, N.N. GORELENKOV, W. GUTTENFELDER, PPPL — The leading candidates for anomalous electron transport in NSTX with increasing beam power are high-frequency Alfvén eigenmodes excited through Doppler-shifted cyclotron resonance with beam ions. However, there exists no current model for predicting the spectra, structure, and amplitude of these modes, which consist of compressional (CAE) and global (GAE) Alfvén eigenmodes. An existing database of neutral beam heated NSTX shots spanning a broad range of plasma parameters is extended to include measurements of CAE/GAE activity in order to statistically investigate the physics parameters controlling the characteristics of these modes and how they contribute to anomalous electron transport. Mode power is found to scale with beam power as $|\text{dB}| \sim P^{2.6}$. Average frequency is shown to correlate strongly with average toroidal mode number ($|n|$ decreases as f increases) across a wide range of beam powers. This correlation might be explained by the parallel resonance condition expected to govern the instability of these modes. Central electron temperature is also found to correlate with mode frequency. A possible explanation is that the higher frequency, lower $|n|$ modes are more effective at electron thermal transport. The physical causes of these correlations require further investigation.

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