Abstract Submitted
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Fast-Electron-Driven Instability in the HSX Stellarator C. DENG, D.L. BROWER, University of California, Los Angeles, D.A. SPONG, Oak Ridge National Laboratory, B.N. BREIZMAN, University of Texas, Austin, A.F. ALMAGRI, D.T. ANDERSON, F.S.B. ANDERSON, W. GUTTENFELDER, K. LIKIN, J. LORE, J. LU, J. SCHMITT, K. ZHAI, University of Wisconsin-Madison — Coherent, global fluctuations in the frequency range 20-120 kHz are observed in the quasi-helically symmetric HSX Stellarator. The modes have n=1 and m>1, peak in the plasma core and are driven by fast electrons associated with electron cyclotron resonance heating. Typically one mode is observed but under certain conditions secondary and tertiary modes are also present with frequency spacing $\sim$20 kHz. Large parallel wavenumber and lack of any frequency scaling with iota suggest the mode is not Alfvenic. Lagrangian formulation for coupled shear Alfven and acoustic waves have been investigated and modeling indicates the fluctuation may be a sound wave with weak Alfvenic coupling. Predicted mode frequencies and band spacing are consistent with observations. The measured fluctuation is very sensitive to magnetic ripple as just a 2% perturbation results in the mode no longer being observed. This is expected for acoustic modes which are more sensitive to ripple by a factor $1/\beta$ compared to Alfvenic modes. **Supported by USDOE contracts DE-FG03-01ER54615 and DE-FG02-93EE54222.*

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