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Theory Experiment

Compressional Alfvén Eigenmode Similarity Study,* W.W. Heidbrink, *UC Irvine*, E.D. Fredrickson, N.N. Gorelenkov, *PPPL*, T.L. Rhodes, *UCLA* — NSTX and DIII-D are nearly ideal for Alfvén eigenmode (AE) similarity experiments, having similar neutral beams, fast-ion to Alfvén speed v_f/v_A , fast-ion pressure, and shape of the plasma, but with a factor of 2 difference in the major radius. Toroidicity-induced AE with ~ 100 kHz frequencies were compared in an earlier study [1]; this paper focuses on higher frequency AE with $f \sim 1$ MHz. Compressional AE (CAE) on NSTX have a polarization, dependence on the fast-ion distribution function, frequency scaling, and low-frequency limit that are qualitatively consistent with CAE theory [2]. Global AE (GAE) are also observed. On DIII-D, coherent modes in this frequency range are observed during low-field (0.6 T) similarity experiments. Experiments will compare the CAE stability limits on DIII-D with the NSTX stability limits, with the aim of determining if CAE will be excited by alphas in a reactor. Predicted differences in the frequency splitting Δf between excited modes will also be used.

- [1] W.W. Heidbrink, et al., *Plasmas Phys. Control. Fusion* **45**, 983 (2003).
- [2] E.D. Fredrickson, et al., *Princeton Plasma Physics Laboratory Report PPPL-3955* (2004).

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