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Study of Toroidicity-Induced Alfvén Eigenmodes on the Madison Symmetric Torus J.J. KOLINER, C.B. FOREST, S. OLIVA, J.K. ANDERSON, J.S. SARFF, A.R. ALMAGRI, University of Wisconsin - Madison, D. SPONG, Oak Ridge National Laboratory — Alfvén waves are likely of fundamental importance in the reversed-field pinch (RFP). The large magnetic fluctuations are expected to inject energy into Alfvén modes, and their subsequent cascade to shorter wavelengths may drive ion heating. A new effort is in progress to understand toroidicity-induced Alfvén eigenmodes (TAE's) through their structure, driving terms and damping mechanisms on the MST. Coupling of multiple eigenmodes can introduce undamped TAE's with frequencies from hundreds of kHz up to the cyclotron frequency at over 2 MHz. These modes can also become unstable by inverse Landau damping due to fast ions, a condition pertinent to neutral beam injection heating on MST and fusion alpha particles in future RFP devices. Frequencies of weakly damped modes have been calculated by solving a 3D partial differential equation that describes shear Alfvén dynamics numerically based on MST equilibrium conditions. To excite the calculated modes, a single strap poloidal antenna connected to a 1 kW broadband amplifier will be employed. An array of 64 toroidally distributed magnetic pickup coils will be utilized synchronously to resolve power spectra and mode numbers in the relevant range of frequencies.

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