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Characterization of Beam-Driven Instabilities in Several RFP Equilibria J.J. KOLINER, C.B. FOREST, J.S. SARFF, J.K. ANDERSON, B.E. CHAPMAN, UW-Madison, L. LIN, W.X. DING, D.L. BROWER, UCLA, D. LIU, UC-Irvine, J.D. HANSON, Auburn U, D.A. SPONG, ORNL — Short-lived, coherent bursts are observed in MST plasmas during 1 MW neutral beam injection (NBI). Fast hydrogen ionizes with $v_{||}/v \approx 0.9$, creating a spatially localized beam-like population of fast ions. Primary bursts have mode numbers n=5, m=1 for magnetic equilibria with edge safety q(a) = 0, and n =6, m=1 for q(a) < 0 discharges. The frequencies of these modes scale with beam velocity. Secondary bursts with n'=n-1 exhibit an Alfvénic scaling of frequencies, as well as fast down-chirping under varying plasma conditions, including low-current ($\leq$ 200 kA) discharges and inductive current profile control (PPCD) cases. Burst prevalence and frequencies exhibit sensitivity to NBI parameters, the q-profile, Alfvén speed, and to 3D effects such as the onset of a Single Helical Axis (SHAx) state. Reduced-MHD calculations for Alfvén continuum frequencies have been performed for q(a)=0, standard q(a)<0, and PPCD cases. The VMEC 3D equilibrium code computes both axisymmetric and 3D SHAx equilibria. We plan to use the V3FIT 3D equilibrium reconstruction code to generate equilibria consistent with observed diagnostics. Work supported by US DoE.

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