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Characterization of an ultra-low-frequency beam-driven instability in the RFP[1] E. PARKE, J.K. ANDERSON, D.J. DEN HARTOG, S. EILERMAN, J.J. KOLINER, S. MUNARETTO, M.D. NORNBERG, J.A. REUSCH, University of Wisconsin-Madison — Decoupling of fast ions from the magnetic field in the reversed-field pinch allows neutral beam injection (NBI) on MST to achieve large fast ion populations that drive a rich variety of instabilities. A bursting instability near the plasma rotation frequency has recently been observed under appropriate conditions. Plasma flow measurements show that the instability propagates at $\sim$7 kHz in the plasma reference frame. This mode also participates in energetic particle mode avalanches to drive significant fast ion transport; a neutral particle analyzer measures reduction of signal at the beam energy by almost 30%. During a burst the tearing mode amplitudes and rotation velocities increase. Bulk-ion heating of approximately 10 eV is also observed, which may be indicative of a reconnection event. Correlated electron temperature fluctuations exhibit a core-peaked structure with an amplitude of 10-15 eV and which depends sensitively on reversal parameter. The correlated electron temperature fluctuations indicate that this mode is electromagnetic in nature. We offer a qualitative comparison to expectations for fishbones, beta-induced Alfvén eigenmodes, and reconnection which highlights the need for greater theoretical support for energetic particle effects in the RFP.

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