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Ion energy balance in enhanced-confinement reversed-field pinch plasmas Z. A. XING, M.D. NORNBERG, J. BOGUSKI, University of Madison-Wisconsin, D. CRAIG, Wheaton College, D.J. DEN HARTOG, K. MCCOLLAM, University of Madison-Wisconsin — Testing the applicability of collisional ion transport theory using tearing suppressed RFP plasma in MST achieved through Pulsed Poloidal Current Drive (PPCD), we find that the ion temperature dynamics in the core to be well-predicted by classical and collisional terms. Prior work demonstrated that impurity ion particle transport in PPCD plasmas is classical. Neoclassical effects on ions in the RFP are small and the stochastic transport is greatly suppressed during PPCD. Recent neutral modelling with DEGAS2 suggests higher core neutral temperatures than expected due to the preferential penetration of higher temperature neutrals generated by charge exchange. Further, investigations through equilibrium reconstruction point to the existence of an inward pinch flow associated with ExB drift. The heat balance model pulls together a wide range of diagnostic data to forward model T_i evolution in PPCD, which is then compared to charge exchange spectroscopy measurements of T_i. Ion power balance is mostly driven by classical effects including compressional heating, electron collisional heating, and charge exchange transport. This understanding provides a good baseline for investigations of anomalous heating in plasmas with tearing mode activity. This work is supported by US DOE.

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