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Thermal Transport Barrier Behavior in a Dynamic Model of the Quasi Single Helicity State[1] I.J. MCKINNEY, P.W. TERRY, University of Wisconsin-Madison — The relaxation oscillations observed in quasi single helicity (QSH) RFP plasmas have been modeled by a reduced MHD mode-coupling model that accounts for the effect of strong shear in the inner most resonant tearing mode (dominant) on tearing modes that are resonant at larger radial positions (secondary). This model predicts a transition threshold in plasma current from a multiple helicity (MH) steady state to a dynamical state that dithers between MH and QSH. It also correctly predicts the scaling of the persistence of the QSH state with plasma current [P.W. Terry, G.G. Whelan, Plasma Phys. Contol. Fusion **56**, 094002 (2014)]. Here, the model is extended to include the evolution of mean temperature by anomalous magnetic-flutter-induced heat transport. The suppression of secondary modes by the strong magnetic shear of the dominant mode creates a thermal transport barrier in QSH. The behavior of this model is compared to experimental observations, including the scaling of secondary mode amplitude with plasma current, temperature profile evolution in the relaxation oscillation, and the scaling of transport barrier thermal structure size with dominant mode amplitude. Good qualitative agreement with experiment indicates that QSH is a type of shear-induced transport barrier.

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