Abstract Submitted
for the APR09 Meeting of
The American Physical Society

Transition between viscous and collisionless regimes of parallel flows damping in RFPs* G. FIKSEL, V.V. MIRNOV, V.A. SVIDZINSKI, Center for Magnetic Self-Organization in Lab and Astrophysical Plasmas and University of Wisconsin - Madison — Strong ion heating is observed during sawtooth crashes in the Madison Symmetric Torus reversed field pinch (RFP) experiments. The mechanism of dissipation due to damping of parallel flows generated by tearing instabilities is examined. In collisional limit, the viscous dissipation is caused by the effect of parallel viscosity in Braginskii equations. Since the ion mean free path λ exceeds the parallel scale length of the flows $k_{||}^{-1}$, the collisional formalism cannot provide reliable predictions. Several kinetic closures have been proposed in the past to incorporate kinetic effects into the plasma momentum equation in the form of Landau-like integral for the effective collisionless viscous force. To investigate the transition from viscous to collisonless regimes we develop an alternative approach based on numerical solution of the kinetic equation with Landau collisional operator. Direct computational modeling of the ion heating yields the rate of dissipation and allows us to follow the transition between two limiting cases as a function of the parameter $k_{||}\lambda$. *The work supported by the N.S.F. and the U.S.D.O.E.

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Date submitted: 12 Jan 2009 Electronic form version 1.4