Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

M3D-K Simulations of Sawteeth and Energetic Particle Transport in Tokamak Plasmas WEI SHEN, Institute of Fusion Theory and Simulation, Zhejiang University, Hangzhou 310027, China, GUOYONG FU, Princeton Plasma Physics Laboratory, Princeton, NJ 08543, USA, ZHENGMAO SHENG, Institute of Fusion Theory and Simulation, Zhejiang University, Hangzhou 310027, China, JOSHUA BRESLAU, Princeton Plasma Physics Laboratory, Princeton, NJ 08543, USA, FENG WANG, Dalian University of Technology, Dalian 116024, China
— Nonlinear simulations of Sawteeth and energetic particle transport are carried out using the kinetic/MHD hybrid code M3D-K. MHD simulations show repeated sawtooth cycles due to a resistive (1,1) internal kink mode for a model tokamak equilibrium. Furthermore, test particle simulations are carried out to study the energetic particle transport due to a sawtooth crash. The results show that energetic particles are redistributed radially in plasma core depending on pitch angle and energy. For trapped particles, the redistribution occurs for particle energy below a critical value in agreement with previous theory. For co-passing particles, the redistribution is strong with little dependence on particle energy. In contrast, the redistribution level of counter-passing particles decreases as particle energy becomes large.

Wei Shen
Institute of Fusion Theory and Simulation,
Zhejiang University, Hangzhou 310027, China

Date submitted: 09 Jul 2013 Electronic form version 1.4