Abstract Submitted for the 50th Annual Meeting
Division of Plasma Physics
November 17–21, 2008, Dallas, Texas

Category Number and Subject:

[**X**] Theory [ ] Experiment

Stability Modeling of the Internal Kink and Application to Tokamak Sawteeth* A.D. Turnbull, M. Choi, M.S. Chu, L.L. Lao, *General Atomics*; N.N. Gorelenkov, G.J. Kramer, *PPPL* – The tokamak sawtooth is widely understood to be due to the ideal or resistive internal kink with the stability threshold modified by kinetic effects. Kinetic effects are usually modeled using generalizations of the Porcelli theory, or with more sophisticated numerical calculations such as from the NOVA-K code. These models, which contain complementary physics, are compared to each other and against DIII-D experiments. The ideal contribution is found to be sensitive to the equilibrium – especially the radius of q=1. Investigation of the effect on the fast particle contribution of varying radial and pitch angle distribution with NOVA-K reveals that the stability is also sensitive to these. Yet using reconstructed equilibria, the Porcelli model, which assumes simplified models for the fast ions, yields results in agreement with experiment. The reasons for this are investigated by studying the dependence of the NOVA-K results on these and the equilibrium parameters. Important physics – especially rotation - is also missing from both models and these effects are also investigated.

*Supported by the US DOE under DE-FG03-95ER54309, DE-AC05-76CH00033, and DE-AC02-76CH03073.