Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Numerical Simulation of Pulsed Parallel Current Drive in RFPs[1] J.M. REYNOLDS, Los Alamos National Laboratory, C.R. SOVINEC, S.C. PRAGER, University of Wisconsin-Madison — The effects of applying inductive electric field pulses to saturated reversed-field pinch states are investigated numerically with the NIMROD code [1]. Simulation diagnostics are used to measure power transfer among groups of harmonics, and the instantaneous free energy in the mean fields is assessed with linear analysis techniques. The most effective technique in the Madison Symmetric Torus applies pulses of poloidal electric field while simultaneously reducing the loop voltage. Nonlinear simulations show that the initial response is an increase in edge parallel current that promptly decreases power transfer from the mean fields to core- and edge-resonant helical fluctuations. Linear analysis finds a consistent trend toward stabilization for these harmonics. The normal nonlinear balance is altered, reducing the power to nonlinearly sustained m=0 modes and decreasing the overall fluctuation level. Reducing loop voltage is shown to have little effect initially, but it keeps the mean profile from evolving to a more pinched and unstable configuration.
[1] Sovinec et al., JCP 195, 355 (2004).
[2] Chapman et al., PoP 9, 2061 (2002).

[1]Supported by the US DOE.

Carl Sovinec
University of Wisconsin-Madison

Date submitted: 23 Jul 2007 Electronic form version 1.4