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Numerical Studies of Tearing Mode Reduction and Suppression of the MHD Dynamo During Pulsed Poloidal Current Drive in the Reversed Field Pinch JIM REYNOLDS, Los Alamos National Lab, CARL SOVINEC, UW-Madison — We identify stabilizing properties of simulated PPCD transients amenable to the decline of interior resonant tearing modes using the 3D fully nonlinear MHD code NIMROD[1]. Our results show the applied transients have a direct stabilizing effect on the internal modes. We demonstrate that stabilization of fluctuations in the interior decreases the nonlinear power flow to other fluctuations. The subsequent evolution of the internal modes is influenced by the action of the penetrating transients and the significant decline in nonlinear coupling. Edge currents driven directly by the applied poloidal electric field initially stabilize core modes. However, the initial response of modes resonant near the exterior is observed to depend on the instantaneous nonlinear state of the standard RFP at application time. Simulations that maintain fixed toroidal electric field as poloidal electric field is applied show an early response in the interior that drains power transmitted out of the mean fields. Later in the evolution, flux surface compression by the poloidal transient may be destabilizing to several modes leading to increased fluctuation levels. When toroidal electric field is simultaneously reduced as the poloidal field is applied, the system is seen to maintain a more stable configuration. The dynamo activity is diminished to where parallel electric field is balanced by the resistive term with driven current density. [1] Sovinec, Gianakon, et al. POP 10, 1727 (2003). LA-UR-06-5139.

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