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Numerical Simulation of Non-inductive Startup in the Pegasus Toroidal Experiment[1] J.B. O'BRYAN, C.R. SOVINEC, University of Wisconsin–Madison — Nonlinear numerical computation is used to investigate the relaxation of non-axisymmetric current channels from washer-gun plasma sources into "tokamak-like" plasmas in the Pegasus Toroidal Experiment. Resistive MHD simulations with the NIMROD code utilize fully 3D, anisotropic, temperature-dependent thermal conductivity corrected for regions of low-magnetization [Braginskii, 1965], temperature-dependent resistivity, and ohmic heating. Our modeling of injection has been improved by implementing a gaussian toroidal shape function for the current drive source, which has a more rapidly converging Fourier expansion than the original half-sine-wave shape, while retaining a similar current profile. The thermal boundary conditions have also been modified to allow a conducting path to form all the way to the electrodes. With sufficient localized vertical magnetic field reversal, the current channel oscillation frequency doubles. After this transition, parallel current profiles suggest the occurrence of magnetic reconnection when the current channel nearly makes contact with itself.

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