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Computational study of a non-ohmic flux compression startup method for spherical tokamaks[1] J.B. O'BRYAN, C.R. SOVINEC, D.J. BATTAGLIA, T.M. BIRD, Univ. of Wisconsin — A computational study is conducted on a method of non-ohmic startup for spherical tokamaks, wherein a toroidal current channel generated by helicity injection undergoes flux compression to produce current amplification. The current channel is electrostatically driven along magnetic field lines from a washer-gun plasma source mounted at the midplane on the outboard side of the Pegasus Toroidal Experiment (Univ. of Wisconsin). The current channel is implemented in NIMROD (nimrodteam.org) using a localized, volumetric current source. Temporally and spatially varying boundary conditions produce the flux compression using data from the equilibrium reconstruction of the vacuum fields. Nonlinear, resistive MHD computations are used in this investigation, which includes anisotropic, temperature-dependent thermal conduction with corrections for demagnetization effects and temperature-dependent resistivity [Braginskii, Reviews of Plasma Physics, 1965]. We discuss the effectiveness of the flux compression, including current distribution and plasma confinement, as predicted by these calculations.

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