Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Improvements to the PSI-TET Equilibrium Code and Ideal MHD Equilibria in HIT-SI CHRIS HANSEN, HIT-SI Group, University of Washington, GEORGE MARKLIN, PSI-Center, University of Washington — Recent improvements to the PSI-TET equilibrium code have been made to increase solution accuracy and speed. Implementation with a hybrid MPI/OpenMP model allows for efficient solution of large system sizes utilizing current and future MPP systems. A mimetic discretization on a 3D tetrahedral mesh with geometric multigrid solvers is employed. The code solves for solutions to the ideal MHD equilibrium equation mu0*j=lambda*B in arbitrary 3D geometry. Lambda is allowed to vary across flux surfaces but must be constant in stochastic regions. Field line tracing is used to identify the location of the separatrix and magnetic axis. A fixed lambda profile, specified as a function of a flux surface variable, is used. Equilibria in HIT-SI have been computed for the homogenous (spheromak) and inhomogeneous (injector) fields separately for experimental comparison. Combined equilibria of interest with spatially variable lambda and injector driving have also been computed for HIT-SI. Equilibria in HIT-SI will be presented for Taylor states and states with spatially varying lambda and injector driving. Solver scalability for MPI and Hybrid approaches will also be presented.

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Date submitted: 17 Jul 2010 Electronic form version 1.4