Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Equilibrium and Stability Calculations in HIT-SI CHRIS HANSEN, GEORGE MARKLIN, THOMAS JARBOE, University of Washington — The PSI-TET equilibrium code solves for solutions to the ideal MHD equilibrium equation mu0*j=lambda*B in arbitrary 3D geometry. A mimetic discretization on a tetrahedral mesh is employed. Geometric multigrid and a hybrid MPI/OpenMP parallelism model are used to provide solver scalability. Scalability has been shown to over 1 Billion degrees of freedom for the calculation of Taylor states. 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 stochastic regions and the 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. Comparison of Taylor states with experimental data have shown good agreement during both the driven and decay phases for HIT- SI. Combined equilibria of interest with injector driving have also been computed for various lambda profiles. The code has recently been upgraded to include a linearized ideal MHD solver which has been used to compute the stability properties of HIT-SI equilibria. Equilibrium states and stability analysis will be presented for a range of lambda profiles with and without injector driving.

Chris Hansen
University of Washington

Date submitted: 25 Jul 2011 Electronic form version 1.4