Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Initial results for linear 3D Toroidal Two-Fluid stability using M3D-C^1[1] S. JARDIN, N. FERRARO, J. BRESLAU, M. CHANCE, J. CHEN, PPPL — We have built upon many of the favorable features of the M3D approach to solving the two-fluid (2F) MHD equations to construct the M3D-C^1 code, which is based on high-order, compact finite elements with C^1 continuity on an unstructured adaptive triangle-based grid. The vector fields use a physics-based decomposition which allows for two energy-conserving subsets of the full equations (reduced MHD). The efficient split-implicit time advance is closely related to the ideal MHD energy principle, and allows time steps several orders of magnitude in excess of the Courant condition based on the Alfven or whistler waves. Previous papers have described this technique applied to the 2F equations in 2D slab geometry. Here, we discuss a subset of the full method as it is applied to the linearized 3D two fluid MHD equations in toroidal geometry. The computational model has a physically based resistivity profile such that the Lundquist number S varies from $\sim 10^8$ in the plasma center to ~ 1 in the "vacuum" region. As part of the validation phase, comparisons are made with ideal MHD codes in the appropriate limit and the dependence of growth rates on dissipative and 2F parameters is presented.

[1]This work was supported by U.S. DoE contract DE-AC02-76CH03073.

S. Jardin
PPPL

Date submitted: 13 Aug 2008

Electronic form version 1.4