

Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Development of an auto-convergent free-boundary axisymmetric equilibrium solver¹ J.A. HUANG, Dartmouth College/SULI, J. MENARD, Princeton Plasma Physics Laboratory, Princeton University — Improvements upon the calculation of the magnetic flux for a given current profile in axisymmetric toroidal plasmas using an iterative, modular algorithm coupled with a fast, direct elliptic solver for the Grad-Shafranov equation to reconstruct a free boundary equilibrium solution are implemented and analyzed. The equilibrium algorithm is modified with the application of the von Hagenow method for determining the flux on the computational boundary, greatly reducing the time cost from $O(N^4)$ to $O(N^2 \ln N)$ machine operations. These improvements allow the grid resolution to be increased efficiently and automatically to reduce the maximum Grad-Shafranov error to values needed for accurate stability calculations on a more effective time scale.

¹Supported by U.S. DOE under DE-AC02-76CH03073 and a DOE Science Undergraduate Laboratory Internship

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Date submitted: 25 Jul 2005

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