Abstract Submitted
for the APR06 Meeting of
The American Physical Society

Methodology of Nonlinear Solver Module, GCNM, as an NTCC Module and SWIM Component[1] H.E. ST. JOHN, L.L. LAO, General Atomics, M. MURAKAMI, J.M. PARK, Oak Ridge National Laboratory — The success of stiff, drift wave type transport models such as GLF23 has necessitated introduction of new methods for solving transport equations. A Globally Convergent Newton Method (GCNM) module, which is part of the "Predictive Transp" project, and which will be one of the optional solvers in the SWIM project was developed to deal with this issue. GCNM is a Newton-based solver for small sets (<500) of nonlinear equations typically encountered in the space and time discretized versions of transport equations. GCNM was designed to be used by other transport codes which must supply the time dependent sources required to solve the equations. For time independent situations GCNM can be used to directly find steady-state solutions without coupling to other codes. This has proved advantageous in ITER AT modeling where the current relaxation time is sufficiently large to preclude time-stepping methods. We describe the initial release of the module and its use.

[1]Work supported by US DOE under DE-FG03-95ER54309 and DE-AC05-00OR22725.

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Date submitted: 12 Jan 2006 Electronic form version 1.4