

Abstract Submitted  
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**Progress on accelerated calculation of 3D MHD equilibrium with the PIES code** DANIEL RABURN, ALLAN REIMAN, Princeton Plasma Physics Laboratory, DONALD MONTICELLO, Retired — Continuing progress has been made in accelerating the 3D MHD equilibrium code, PIES, using an external numerical wrapper. The PIES code (Princeton Iterative Equilibrium Solver) is capable of calculating 3D MHD equilibria with islands. The numerical wrapper has been demonstrated to greatly improve the rate of convergence in numerous cases corresponding to equilibria in the TFTR device where magnetic islands are present; the numerical wrapper makes use of a Jacobian-free Newton-Krylov solver along with adaptive preconditioning and a sophisticated subspace-restricted Levenberg backtracking algorithm. The wrapper has recently been improved by automation which combines the preexisting backtracking algorithm with insights gained from the stability of the Picard algorithm traditionally used with PIES. Improved progress logging and stopping criteria have also been incorporated in to the numerical wrapper.

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