

Abstract Submitted
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The PIES2012 Code for Calculating 3D Equilibria with Islands and Stochastic Regions¹ DONALD MONTICELLO, ALLAN REIMAN, DANIEL RABURN, Princeton Plasma Physics Lab — We have made major modifications to the PIES 3D equilibrium code to produce a new version, PIES2012. The new version uses an adaptive radial grid for calculating equilibrium currents. A subset of the flux surfaces conform closely to island separatrices, providing an accurate treatment of the effects driving the neoclassical tearing mode. There is now a set of grid surfaces that conform to the flux surfaces in the interiors of the islands, allowing the proper treatment of the current profiles in the islands, which play an important role in tearing phenomena. We have verified that we can introduce appropriate current profiles in the islands to suppress their growth, allowing us to simulate situations where islands are allowed to grow at some rational surfaces but not others. Placement of grid surfaces between islands is guided by the locations of high order fixed points, allowing us to avoid spectral pollution and providing a more robust, and smoother convergence of the code. The code now has an option for turning on a vertical magnetic field to fix the position of the magnetic axis, which models the horizontal feedback positioning of a tokamak plasma. The code has a new option for using a Jacobian-Free Newton Krylov scheme for convergence. The code now also contains a model that properly handles stochastic regions with nonzero pressure gradients.

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