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Internal magnetic field structure of perturbed tokamak equilibria JONG-KYU PARK, JONATHAN MENARD, Princeton Plasma Physics Laboratory, ALLEN BOOZER, Columbia University, ALAN GLASSER, Los Alamos National Laboratory — The 3D magnetic field structure of perturbed tokamak equilibria is important for understanding phenomena such as error field correction and plasma flow damping. Perturbed quantities such as plasma displacement and magnetic field can be obtained by minimizing the total potential energy numerically using codes such as the DCON ideal stability code. For error field correction applications, initial work is focusing on determining which external magnetic perturbations tend to drive magnetic islands. Jumps on the rational surfaces in the radial derivative of the normal magnetic field perturbation give the singular currents that arise in an ideal plasma to prevent an island from opening[C. Nührenberg and A. H. Boozer, Phys. Plasmas 10, 2840 (2003)]. These currents serve as a measure of the tendency of a perturbation to open a magnetic island. Additionally as a first step benchmarking exercise, we compare the 3D structure of NSTX instabilities as predicted by the DCON and MARS-F codes in the absence of external error fields. Future applications include examining the interplay between external error fields, plasma rotation, and plasma resistivity using the MARS-F code.

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