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Theory Experiment

Development and Testing of EFIT 3D Equilibrium Reconstruction Capability,* L.L. Lao, N.W. Ferraro, E.J. Strait, A.D. Turnbull *GA*; J.D. King, *ORISE* – Recent development and testing of EFIT capability to reconstruct tokamak 3D perturbed equilibrium are described. The 3D extension is based on an expansion of the MHD equations to account for the 3D effects. EFIT uses the cylindrical coordinate system and can include magnetic island and stochastic effects. Several linearization schemes are being explored to improve the EFIT 3D perturbed solutions. Algorithms are also being developed to allow EFIT to reconstruct 3D perturbed equilibria directly making use of plasma response to 3D perturbations from the MARS or M3D-C1 MHD codes. Other efforts include testing of the new EFIT 3D capability using simulated magnetic data based on response calculations from MARS and M3D-C1, and performing detailed benchmarking calculations against other 3D codes such as VMEC / V3FIT. Reconstruction examples using EFIT and the new DIII-D 3D magnetic measurements to reconstruct 3D perturbed experimental equilibria using well-diagnosed discharges from DIII-D error field, RWM, and RMP experiments will be presented.

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