

DIII-D Plasma Response to Asymmetric Magnetic Perturbations*

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DIII-D equilibria are perturbed by toroidally asymmetric fields both in the form of intrinsic error fields and fields directly applied by the C-coils and I-coils. These fields are applied for ELM control, rotation control, and other plasma physics experiments. Using the NIMROD code, the vacuum magnetic fields associated with the intrinsic and applied error fields are superimposed on an EFIT-reconstructed equilibrium as an initial condition. The calculations include a small vacuum region, but the simulation boundary must be placed interior to the I-coils, which are inside the limiter. The NIMROD ideal conductor boundary conditions hold the normal component of the perturbing fields constant at the simulation boundary and do not allow the flux to escape. The plasma evolves in response to the applied fields until a new steady-state 3D equilibrium solution is achieved. Several examples of applied fields with predominantly $n=1$ or $n=3$ components are presented, for various equilibrium conditions. The stability properties of the resulting 3D equilibria with respect to peeling-ballooning modes, locked modes, etc., can be subsequently investigated with NIMROD.

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