

## Comparison of NIMROD 3D RMP simulations with analytic error field theory

V. Izzo, UCSD

In MHD simulations of DIII-D RMP experiments, realistic geometry, inclusion of sufficient physics, and experimentally relevant dimensionless parameters will all be important to achieving predictive and quantitatively comparable results. Here, 3D resistive MHD NIMROD simulations are performed in realistic geometry, but with reduced Lundquist number for computational expediency. Vacuum RMP fields are initially applied to a DIII-D equilibrium with an artificially imposed rotation profile and allowed to evolve self-consistently. Several features are compared directly with Fitzpatrick error field theory. Most significantly, the predicted rotational screening is compared with NIMROD using a non-rotating simulation to numerically determine the ideal amplification factor for the various resonant modes. The theory qualitatively predicts mode amplitude dependence on  $m$ , but under-predicts the mode amplitudes almost everywhere. The theory applies to a straight cylinder and thus differs from the NIMROD calculations most notably in terms of toroidal mode coupling effects. NIMROD simulations in a periodic linear geometry allow a direct determination of the significance of these effects in the calculations and experimentally. Further calculations seek to determine the effects of increasing Lundquist number on  $E \times B$  convection induced transport.