

# Post-APS 2<sup>nd</sup> Error Magnetic Field Workshop Summary

## 10/28/2005, Denver, CO

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The workshop was productive with extensive discussions on many relevant physics issues. This includes the importance of non-resonant error field in error correction, dynamical correction of error field to account for interactions among the external coils as the discharge evolves, magnetic surface response to an imposed perturbation magnetic field, two-fluid effects on error field, locked mode threshold, plasma effects on outermost surface, and 3-D equilibrium reconstruction in stellarators. Key issues that require attention are briefly summarized below. A common issue that was frequently brought up is the importance of inclusion of plasma response in the modeling. Analyses ignoring plasma response to the perturbation field cannot satisfactorily account for the observations in quite a number of experiments. More accurate analysis and modeling tools to include the plasma response are being developed and/or being planned. The next Error Magnetic Workshop will be taking place at the APS DPP meeting in Orlando on November 2007. It is expected that progress in these areas will be made and will be reviewed and discussed at the 2007 workshop.

### Key/New Physics Issues

- Accurate theory and modeling of plasma response to external non-axisymmetric  $\delta B$  field
- Role of non-resonant error field
- Plasma braking, especially by non-resonant  $\delta B$
- Theoretical understanding of empirical error field corrections
- Endpoint versus dynamic error field
- Role of SOL currents

### New Experiments

- C-Mod error field perturbation experiment
- Additional C-Mod experiments on B-field scaling of locked mode threshold
- C-Mod error field threshold experiment with different A-Coil phase and spectra
- Measurement of rotation profiles in error field experiments
- Magnetic braking in Ohmic plasma or plasma without momentum source
- Error-field/external-field-perturbation as diagnostic tool to probe plasmas
- New DIII-D empirical error field correction with removal of one B-Coil feed error
- Additional NSTX locked mode threshold experiments on B-field and density scaling

### New Analysis and Tools

- Relax single-mode assumption in two-fluid analysis of error field
- Ideal stability codes (DCON, GATO) as tools to investigate plasma response (eigen modes, singular current behavior at rational surfaces)

- Plasma response based on rotational resistive MHD code MARS
- Planned PIES analyses of DIII-D error field experiments
- Development of filament plasma response model