

Abstract Submitted
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**3-D Equilibrium and Magnetic Island due to Error
Magnetic Field in the DIII-D Tokamak¹**

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YOU, KBSI, E.A. LAZARUS, S.P. HIRSHMAN, ORNL — The effects
of error magnetic field due to toroidal asymmetry of the external shaping
coils on the 2-D equilibrium states of DIII-D discharges are studied using
a perturbative approach and the VMEC 3-D equilibrium code. In the
perturbative approach, the plasma is assumed to stay nearly axisymmet-
ric and the effects of the error magnetic field on the magnetic surfaces
are analyzed using the Green's function method. The results indicate
that a 1-2 cm radial shift in the external coil location can produce a
significant stochastic region near the plasma separatrix boundary and
large magnetic islands around the outer rational q surfaces. This may
explain the separatrix location differences observed between magnetic
reconstructions which assume toroidal symmetry and Thomson scatter-
ing measurements of electron temperature in some DIII-D discharges.
The results also indicate that the C-coil is more effective in correcting
the error magnetic field at the outer rational q surfaces than at the
separatrix. At high β , the plasma response can be significant. This is
analyzed using the VMEC 3-D equilibrium code.

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