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Theory Experiment

Effects of 3D Toroidally Asymmetric Magnetic Field on Tokamak Magnetic Surfaces,* L.L. Lao, D.P. Brennan, M.S. Chu, A.W. Hyatt, G.L. Jackson, R.J. La Haye, M.J. Schaffer, E. Soon, E.J. Strait, T.S. Taylor, A.D. Turnbull, *GA* – The effects of 3D error magnetic field on magnetic surfaces are investigated using the DIII-D internal coils (I-Coils). Slowly rotating $n=1$ traveling waves at 5 Hz and various amplitudes were applied to systematically perturb the edge surfaces by programming the I-Coil currents. The vertical separatrix location difference between EFIT magnetic reconstructions that assumes toroidal symmetry and Thomson scattering T_e measurements responds in phase to the applied perturbed field. The oscillation amplitudes increase with the strength of the applied field but are much smaller than those expected from the applied field alone. The results indicate that plasma response is important. Various plasma response models based on results from the MHD codes MARS and GATO are being developed and compared to the experimental observations. To more accurately evaluate the effects of magnetic measurement errors, a new form of the magnetic uncertainty matrix is also being implemented into EFIT. Details will be presented.

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