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Effects of Magnetic Measurement Uncertainty on Tokamak Equilibrium Reconstruction[1] A.L. MONTGOMERY, Butler University, L.L. LAO, E.J. STRAIT, T.S. TAYLOR, GA — Reconstruction of the magnetic topology and current density profile from external magnetic diagnostics is vital to the study of tokamak plasmas. It has long been suspected that external magnetic measurements may contain information about the current density near the edge of a shaped plasma. To better reconstruct this feature, the sensitivity of the reconstruction to uncertainty in magnetic measurements must be determined. This is done by analyzing existing DIII-D data for the effect of measurement uncertainty on the edge current density and the location of the separatrix. The new magnetic uncertainty matrix recently added to EFIT provides a basis for this numerical analysis, and these calculations are compared with simple analytical models. This study begins with examination of measurement error in the tokamak with no plasma, and continues to the more complicated plasma scenario. The relative importance of the various measurements can be determined, with the divertor X-point likely to be the most sensitive to the edge current density.

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