

**Abstract Submitted for the 50th Annual Meeting
Division of Plasma Physics
November 17–21, 2008, Dallas, Texas**

Category Number and Subject:

Theory Experiment

The Impact of Correlations on MHD Equilibrium Reconstruction,* A.M. Jacobs, *Hendrix College*, J.M. Finn, *LANL*, L.L. Lao, E.J. Strait, *GA* – Equilibrium reconstruction is vital to tokamak operation and post-discharge analysis. EFIT performs equilibrium reconstruction with a χ^2 minimization scheme that utilizes SVD and weighs terms by the variance of the data. It is shown how this regression can be further generalized by incorporating the covariance matrix of the data, which includes correlations between measurements. Sample covariance matrices are computed and used to calculate correlations in a variety of DIII-D magnetic data. The ultimate goal is a modified version of EFIT that takes advantage of the more generalized regression scheme to explore the possibility that highly correlated data could allow for a reduction in uncertainty [1]. The reconstructions of traditional SVD and the generalized covariance scheme are compared. Preliminary results indicate instances of high correlation in quiescent H-mode shots.

[1] C.S. Jones, et al., *Nucl. Fusion* **46**, 335 (2006).

*Supported by US DOE National Undergraduate Fusion Fellowship and DE-FC02-04ER54698.