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3D Equilibrium Reconstruction in Stellarators and Tokamaks with STELLOPT[1] SAMUEL LAZERSON, NOVIMIR PABLANT, DAVID GATES, HUTCH NEILSON, RAFFI NAZIKIAN, Princeton Plasma Physics Laboratory, YASUHIRO SUZUKI, KIYOMASA WATANABE, KATSUMI IDA, SATORU SAKAKIBARA, National Institute for Fusion Science, LHD EXPERIMENTAL TEAM — The ability to model and predict the behavior of stellarators and tokamaks requires an ability to match simulation parameters with experimental measurements. This process, known as experimental reconstruction, has been used extensively with 2D axisymmetric codes for Tokamaks. These codes, such as EFIT, lack the ability to model the 3D nature of stellarators and the emerging 3D nature of Tokamaks. Phenomena such as, shielding of islands by neoclassical flows and the suppression of edge localized modes through application of 3D fields, highlight the need for such 3D tools. The stellarator optimizer code STELLOPT has been modified to match 3D VMEC equilibria to experimental measurements. This has allowed 3D experimental reconstructions to be preformed on W7-AS, LHD, and DIII-D devices. The free boundary VMEC equilibria are matched to Thomson profiles (ne and Te), charge exchange measurements (Ti), MSE (polarization angle), and magnetic diagnostics (B-probes, flux loops, Rogowski coils). Three dimensional reconstructed equilibria are presented alongside confidence metrics for the reconstruction process.

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