Abstract Submitted
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Initial error field correction studies in the National Spherical Torus Experiment Upgrade[1] C. E. MYERS, S. P. GERHARDT, J. E. MENARD, N. M. FERRARO, J.-K. PARK, R. E. BELL, B. P. LEBLANC, M. PODESTA, Princeton Plasma Physics Laboratory, S. A. SABBAGH, Columbia University, THE NSTX-U TEAM — Non-axisymmetries in the magnetic field coils and/or the passive conducting structures of tokamaks produce small but important 'error fields' that can strongly degrade plasma performance. This paper reports on initial error field correction (EFC) studies in the National Spherical Torus Experiment Upgrade (NSTX-U). The NSTX-U device is equipped with an array of six independently powered EFC coils that produce non-axisymmetric radial magnetic fields at the midplane. These coils are used to perform compass scans where an $n = 1$ magnetic perturbation is ramped in amplitude at constant phase until the plasma rotation locks. Successive discharges are taken with different toroidal phases to determine the optimum EFC required to avoid locking. Multiple compass scans confirm that substantial EFC coil current (1200 A-turns) is required to achieve optimum performance in the flattop of beam-heated L-mode discharges. Interestingly, the $q = 2$ surface is locked throughout these L-modes such that the applied magnetic perturbations lock the sawtoothing core of the plasma. Additional compass scans early in the discharge indicate that the required EFC evolves as a function of time. Efforts to identify the various error field sources, including metrology of the main vertical field coils, are ongoing.

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