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Multi-mode Error Field Correction[1] J.T. SCOVILLE, R.J. LA HAYE, *General Atomics* — The stable operating parameter space of a tokamak can be limited by the presence of small perturbations on the axisymmetric magnetic field. On the DIII–D tokamak, these error fields are partially corrected by the C-coil, which is energized routinely during every plasma discharge. The C-coil is primarily programmed to minimize the m=2,n=1 mode, but simple torque-balance arguments suggest that modes couple through the plasma viscosity, making it important to reduce several low order modes simultaneously. This is corroborated by data from experiments in which we measure the threshold for the onset of locked modes in low density Ohmic discharges. Analysis gives a best fit to the data with $\bar{n}_{\rm LM} \sim \sum_{\rm mn} C_{\rm mn} B^2_{\rm rmn}$, where $B_{\rm rmn}$ is the radial magnetic field of the m, n mode. In recent experiments, we have used a combination of two correction coils, the C-coil and the n=1 coil, to apply an error field spectrum with variable low order mode weights. Results include the achievement of very low densities in plasmas free of locked modes, *e.g.*, $\bar{n}_{\rm e} = 4.0 \times 10^{12}$ cm^{-3} in a 1.0 MA Ohmic double null divertor discharge. The stability of these low density discharges was not limited by the usual onset of locked modes, but by high energy electron bursts. The multi-mode error field correction experiments on DIII-D are contributing to the design of correction coils for ITER.

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