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Theory Experiment

Effect of the I-coil on the Low Density Locked Mode Threshold in DIII-D,* J.T. Scoville, R.J. La Haye, *General Atomics* – In DIII-D Ohmic discharges, the low density limit of the tokamak is defined by the onset of locked modes. These non-rotating instabilities are driven by the presence of an intrinsic tokamak error field created by small errors in coil locations and coil symmetries. For several years, the DIII-D external error field correction coil system (C-coil) has been used to partially correct the tokamak's error field, leading to better plasma stability. Installation of the new internal coil set (I-coil) has allowed further exploration of the error field by using the I-coil to apply a variety of poloidal mode spectra and field helicities, capabilities that the C-coil does not have. A systematic scan over I-coil parameters that include amplitude, phase, and poloidal mode spectrum has recently been performed, documenting the effects on the low density locked mode threshold. We present the results of these experiments, compare them to C-coil results, and discuss what is revealed about the error field component resonant with the locked mode instability.

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