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**Coupled Resonant Error Field Mode Components and  
the Low Density Locked Mode Threshold<sup>1</sup>** J.T. SCOVILLE, R.J.

LA HAYE, General Atomics — The stable operating parameter space of a tokamak can be limited by small perturbations on the axisymmetric magnetic field. On DIII-D, the low density limit is determined by the onset of non-rotating (locked)  $m/n = 2/1$  modes, which can be partly driven by coupling to other modes. Viscous coupling of error field mode components can result when components resonant at other flux surfaces within the plasma, such as  $q=1$  and  $q=3$ , reduce the plasma rotation at  $q=2$ . Direct toroidal sideband coupling is also possible wherein the  $1/1$  and  $3/1$  components help drive reconnection of the  $2/1$  mode. In recent experiments we have used the combined error fields from two correction coils (the  $n=1$  coil and the C-coil) to vary the error field spectrum and document the locked mode threshold. Modification of the applied mode spectrum allows analysis of the relative importance of the individual low-order mode components and comparison of the viscous and direct coupling effects. Multi-mode analysis demonstrates the need to correct several mode components simultaneously and provides the data necessary to implement the optimum error field correction algorithm for DIII-D and to design a suitable error field correction coil set for ITER. Recent data and results of the multi-mode analysis will be presented.

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Prefer Oral Session  
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