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Investigation of Resonant and Non-resonant Magnetic Braking in Plasmas Above the No-Wall Beta Limit[1] J.T. SCOVILLE, E.J. STRAIT, R.J. LA HAYE, General Atomics, A.M. GAROFALO, H. REIMERDES, Columbia U., M. OKABAYASHI, PPPL — In the DIII-D tokamak, stabilization of the $n = 1$ ideal kink resistive wall mode (RWM) is achieved by sustaining toroidal plasma rotation above a critical threshold. The toroidal axisymmetry of the magnetic field is important for maintaining rotation and allowing sustained access to regimes with beta significantly above the no-wall limit. To help elucidate the role of rotation in RWM stability, magnetic braking is used as a tool to modify the rotation profile. The effects of the non-axisymmetric field perturbations are studied for three cases: (1) resonant $m/n = 2/1$ perturbations with $q_{min} \geq 2$, (2) non-resonant perturbations with $q_{min} > 2$, and (3) non-resonant $n = 3$ perturbations with $q_{min} \geq 1.5$. Comparisons are made to theories such as the "induction motor model" and "transit time magnetic pumping".

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