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RMPs, Zonal Flows, and Microturbulence in the DIII-D L-mode¹ Z.R. WILLIAMS, Hope College, M.J. PUESCHEL, Institute for Fusion Studies, University of Texas at Austin, P.W. TERRY, University of Wisconsin-Madison, TAKASHI NISHIZAWA, Max Planck Institute for Plasma Physics, D.M. KRIETE, M.D. NORNBERG, J.S. SARFF, G.R. MCKEE, University of Wisconsin-Madison, D.M. ORLOV, University of California, San Diego — Recent measurements using Beam Emission Spectroscopy on DIII-D tokamak L-mode plasmas report a dependence of microturbulent amplitude on the strength of an externally applied Resonant Magnetic Perturbation (RMP). Density fluctuations in the range of 50 - 100 kHz increase as the amplitude of an n = 3 I-coil RMP is raised incrementally. This behavior is suggestive of the presence of magnetic-flutter-induced zonal-flow erosion, a phenomenon previously documented on the Reversed-Field Pinch (RFP). Gyrokinetic simulations of the RFP reveal that small tearing mode fluctuations serve to degrade zonal flow structures, resulting in an increase in microturbulence levels. These DIII-D discharges are studied using gyrokinetics to determine if RMPs in tokamaks play an analogous role to tearing modes in the RFP. An increase in microturbulent activity occurs in the simulations over a range of externally applied RMP amplitudes, in qualitative agreement with the experiment. The effect requires flux-surface-breaking magnetic perturbations. Discrepancies in microturbulent amplitude scaling are addressed via profile corrugations.

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