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Verification of Resistive Wall Mode Kinetic Stabilization Physics and Implications for Future Tokamaks J.W. BERKERY, S.A. SABBAGH, Columbia University, R. BETTI, University of Rochester, J. MANICKAM, PPPL — It is important to understand and verify the physics of stabilization of the resistive wall mode (RWM) instability that can disrupt operation of future tokamaks. Recent theory and modeling has generally shown good agreement with experiment. This new understanding leads to different expectations of RWM stability in future devices. In particular, high or low rotation can stabilize the mode through resonance with particle motions, while intermediate rotation can yield RWM instability. Energetic particles have been shown to be generally stabilizing. Collisions both dissipate the mode energy and damp the stabilizing kinetic effects. Quantitative comparisons between experiment and theory are made using the MISK code. Theory alterations now focus on finding key changes that improve agreement, and the implications for future devices. One such alteration is the inclusion of anisotropic distribution functions, which changes the pressure-driven destabilization term. Present calculations show improved quantitative agreement with NSTX experimental marginal stability points, and that α particles will be required in ITER to maintain a stable RWM for expected plasma rotation profiles. Supported by U.S. DOE contracts DE-FG02-99ER54524, DE-AC02-09CH11466, and DE-FG02-93ER54215.

John Berkery
Columbia University

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