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Kinetic stability of internal kink in ITER[1] BO HU, R. BETTI, University of Rochester, J. MANICKAM, Princeton Plasma Physics Laboratory — ITER's standard operation baseline scenario is susceptible to the $m/n = 1/1$ internal kink instability. Kinetic effects modify the inertia and the perturbed energy of the mode, which are important to determine the mode stability. Numerical results are obtained for different q-profiles and plasma betas for ITER-like realistic equilibria using the QSOLVER and PEST1 codes and a kinetic postprocessor. The MHD branch is found to be fully stabilized by the trapped particle compressibility. The stability of the fishbone branch is also greatly affected by the kinetic effects. The trapped electrons contribute a Kruskal-Oberman term because electron collisionalty is much smaller than the mode frequency. Since the bounce frequency of the trapped thermal ions in the core region is close to the mode frequency, the trapped ion compressibility is reduced and damping is increased. Depending on the size of the $q = 1$ radius, the trapped alpha particles can be stabilizing or destabilizing. The kinetic ion inertia enhancement(including damping) is also considered and provides a stabilizing effect. The fishbone branch is found to be stable if the $q = 1$ radius is below a critical value.

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