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Kinetic stability of internal kink mode in ITER B. HU, R. BETTI, University of Rochester, J. MANICKAM, PPPL — 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 potential energy of the mode, which are the two key elements 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. In particular, for the fishbone branch, the trapped suprathermal bulk electrons contribute a significant portion of Kruskal-Oberman type to the perturbed potential energy; the trapped bulk ion contribution is reduced by the effects of the bounce frequency and is comparable to the circulating bulk ion one; the trapped α contribution can be stabilizing or destabilizing depending on the radius of $q = 1$ surface. For the fishbone mode, the kinetic ion resonant contribution is always opposite to the α's one and is stabilizing. The kinetic modifications of the inertia are mainly from the trapped and circulating bulk ions, and they are always stabilizing for the fishbones. The fishbone branch is destabilized at high β or large radii of the $q = 1$ surface, almost regardless of the fluid instability drive. For moderate magnetic shear within the $q = 1$ surface, the MHD branch is fully suppressed by the kinetic effects over a large range of parameters, and for q-profiles with low magnetic shear within the $q = 1$ surface, the MHD branch can be destabilized at high β or larger radii of the $q = 1$ surface.

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