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Current driven instability in finite beta plasmas ISTVAN PUSZTAI, MIT PSFC and Chalmers Univ. Technology, PETER J. CATTO, MIT PSFC, FELIX I. PARRA, MIT PSFC and Oxford Univ., Physics Dept., MICHAEL BARNES, MIT PSFC and Texas Univ. at Austin, Physics Dept. — The induced electric field in a tokamak drives a parallel electron current flow. In an inhomogeneous, finite beta plasma, when this electron flow is non-negligible compared to the ion thermal speed, the Alfvén mode wave solutions of the electromagnetic gyrokinetic equation can become an almost purely growing kink mode. Using the new "low-flow" version of the gyrokinetic code GS2 developed for momentum transport studies [Barnes et al 2013 to appear in Phys. Rev. Lett., arXiv: 1304.3633], we are able to model the effect of the induced parallel electric field on the electron distribution to study the impact of a current on stability. We identify high mode number kink modes in GS2 simulations and make comparisons to analytical theory in a sheared magnetic geometry. We find a reassuring agreement with analytical results both in terms of parametric dependences of mode frequencies and growth rates, and regarding the radial mode structure.

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