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**Effect of Two-Fluid Equilibrium Flow on Tearing Linear Stability**[1]

LUCA GUAZZOTTO, Auburn University, RICCARDO BETTI, University of Rochester — Tearing modes have been studied extensively. Much attention has been devoted to two-fluid effects (i.e. on the effect of distinguishing ion and electron dynamics) on their behavior. However, the effect of equilibrium flow on tearing stability, in particular when the equilibrium is described with a two-fluid model, has not been examined in detail. In two-fluid equilibrium ions and electrons are frozen into different surfaces: a flow surface for ions and the magnetic surface for (massless) electrons. Thus in toroidal systems plasma poloidal flow is not aligned with magnetic surfaces and there is a $\theta$-dependent component of the velocity $v_\psi \sim \sin\theta$ normal to the magnetic surfaces. Using a slab model we highlight the differences introduced to the standard tearing mode problem by the presence of a finite $v_\psi$. In particular, it is found that a single-mode analysis is not possible, even if all the effects of toroidicity other than $v_\psi$ are neglected. Moreover, a finite $v_\psi$ introduces a higher-order derivative for the perturbed velocity than in the single-fluid version of the problem. We report on our progress in building a solution for the slab model problem including a sinusoidal component of the equilibrium velocity normal to the magnetic surfaces.

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