MHD spectroscopic analysis of the resistive tearing growth rate under the influence of background flow

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In recent years the resistive tearing instability, first introduced by Furth, Killeen, and Rosenbluth in 1963 [1], has garnered renewed interest due to the potentially pivotal role it plays in magnetic reconnection [2]. Understanding reconnection itself is instrumental in explaining a variety of eruptive events such as solar flares or the disruption of plasma confinement in tokamaks [3]. Whilst a finite resistivity and magnetic shear are the necessary requirements for the tearing instability, the growth rate is also influenced by other physical effects such as the background flow, viscosity, or the Hall current. All three of the aforementioned contributions are available in the MHD spectroscopic code *Legolas* [4, *legolas.science*] and can be included in tearing-unstable configurations.

Using *Legolas* we explore the modification of the tearing growth rate by flow and viscosity for two plasma slab configurations: one with a rotating field [5] and a Harris sheet [6]. These magnetic fields are paired with different equilibrium flow profiles, either with or without an inflexion point. Relevant parameters such as maximal flow speed, density, and plasma-β are identified and varied. This parametric study presents another step towards a full understanding of the combined effects of background flow, magnetic shear, and finite resistivity on the linear MHD spectrum.

References

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