Influence of equilibrium flow on the resistive tearing mode

J. De Jonghe[1] and R. Keppens[1]

[1] *Centre for mathematical Plasma-Astrophysics, KU Leuven, Leuven, 3001, Belgium*

The resistive tearing mode instability is a well-known phenomenon [1] that is often linked to magnetic reconnection. When magnetic field lines reconnect, this leads to a conversion of magnetic energy into kinetic or thermal energy. In turn, this can result in interesting events such as solar flares in the solar corona or the disruption of plasma confinement in tokamaks. Therefore, understanding how this tearing instability is influenced by various physical effects can lead to new insights on how such events are triggered.

Since the literature regularly claims that flow has a stabilizing effect on the resistive tearing mode [2, 3], we use the new linear 1D magnetohydrodynamic (MHD) spectral code *Legolas* (https://legolas.science) [4] to combine the effects of equilibrium flow and resistivity to examine the influence of the flow on the tearing mode parametrically. This allows us to investigate the influence of the flow speed, the wavelength, the angle between flow and wavevector, etc. in different magnetic field configurations. This parametric study serves as a first step in identifying the combined effects of equilibrium flow, magnetic shear and finite resistivity on the linear MHD spectrum.

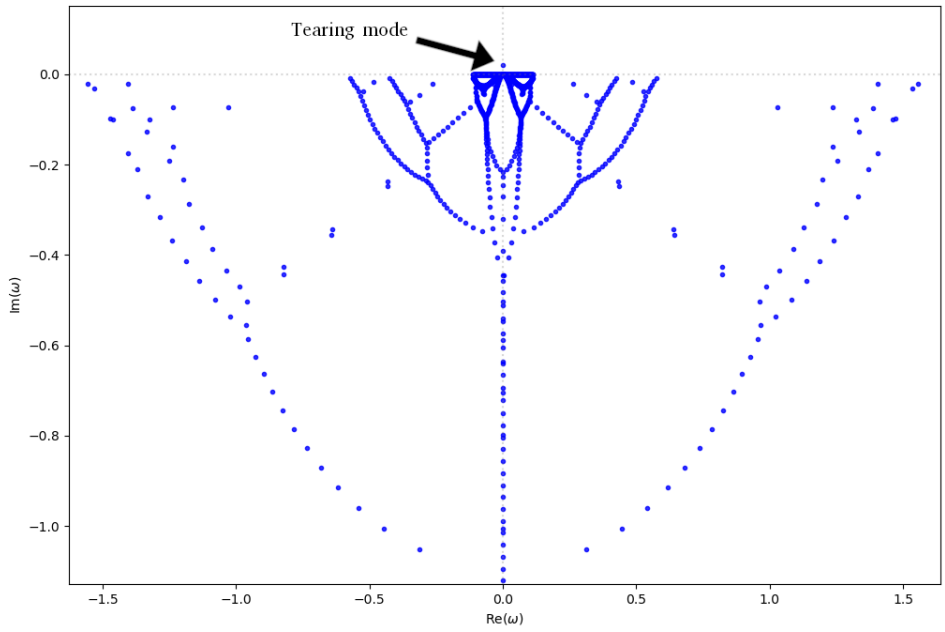

Figure 1: *Example of a resistive spectrum with equilibrium flow containing a tearing mode.*

This work is supported by funding from the European Research Council (ERC) under the European Unions Horizon 2020 research and innovation programme, Grant agreement No. 833251 PROMINENT ERC-ADG 2018.

References:

[1] H. Goedbloed, R. Keppens, and S. Poedts, *Magnetohydrodynamics of Laboratory and Astrophysical Plasmas* (Cambridge University Press, 2019).
[2] S. V. Bulanov, S. I. Syrovatskii, and J. Sakai, *ZhETF Pisma Redaktsiiu* **28**, 193-195 (1978).
[3] X. L. Chen, and P. J. Morrison, *Physics of Fluids B: Plasma Physics* **2**, 495 (1990).
[4] N. Claes, J. De Jonghe, and R. Keppens, *ApJS* **251**, 25 (2020).