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Self-similarity in the magnetic Rayleigh-Taylor instability

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The growth of a turbulent mixing layer driven by the Rayleigh-Taylor instability (RTI) is the result of non-linear interactions between structures of different sizes which merge and compete under the effect of buoyancy forces. In the asymptotic self-similar regime, the mixing layer width evolves as the square of time.
In the Boussinesq approximation, it was shown, considering the simplified dynamics of dominant modes at large scales, that the growth rate is closely related to irreversible mixing and anisotropy of the turbulent layer.
These typical features of the RTI are strongly modified in the presence of induced magnetic fields. If a background constant magnetic field B0 is imposed parallel or normal to the initial interface between the fluids at rest, the structures composing the mixing layer are significantly changed compared to hydrodynamics: they can become either much bigger, or thinner and stretched in the vertical direction, respectively.
The magnetic RTI plays a significant role within astrophysical objects like solar prominences, or in Inertial Confinement Fusion. Recently, we have extended the large-scale theory to the magnetohydrodynamics (MHD) framework

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