Tearing mode in stratified plasmas with an effective gravitational field

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Abstract

Magnetic reconnection can develop spontaneously via the tearing instability, often invoked to explain disruptive instabilities in fusion devices, solar flares, the generation of periodic density disturbances at the tip of helmet streamers, and flux transfer events at the Earth's dayside magnetopause. However, in many such environments the presence of gravity, magnetic field curvature or other forms of acceleration often result in situations of a heavy-over-light plasma in an effective gravitational field with an embedded current sheet. In this work we study the resistive tearing mode that develops in a current sheet in the presence of a density gradient under the effect of an effective constant gravitational acceleration and we show that the presence of stratification modifies the properties of the tearing mode instability both in the case of stable and unstable stratification.

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