Instituto de Matemáticas (IMAG), Universidad de Granada
12 February 2026

On the topology of the magnetic lines of large solutions to the Magnetohydrodynamic equations in $\mathbb{R}^3$

Claudia Peña
Basque Center for Applied Mathematics
cpena@bcamath.org

Abstract

The purpose of this talk is to present the article [1], in which we establish two results: first, we introduce a new class of global strong solutions to the magnetohydrodynamic system in $\mathbb{R}^3$ with initial data (u_0, b_0) of arbitrarily large size in any critical space. To do so, we impose a smallness condition on the difference $u_0 - b_0$. Then we use this result to prove magnetic reconnection for a suitable class of (large) solutions. With this, we mean a change of topology of the integral lines of the magnetic field b under the evolution. The proof relies on counting the number of hyperbolic critical points of the solutions, and this instance is structurally stable.

References

[1] Lucà, R. and Peña, C. (2025) *On the topology of the magnetic lines of large solutions to the Magnetohydrodynamic equations in* $\mathbb{R}^3$. Preprint: arXiv:2505.09340.