

Numerical approximations: Finite elements for MHD modeling

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Abstract

This lecture revisits the main steps and requirements for the design of efficient strategies, when we are concerned by partial differential equations. We focus on finite element methods in the context of Magneto Hydrodynamic equations (MHD). The need of stability improvement when dealing with convection dominated flows is investigated. Smooth finite elements with continuity of first derivatives (C1) for structured and unstructured meshes, are used as practical examples for applications to Grad-Shafranov and reduced-MHD equations.