

Finite Elements for Magnetohydrodynamics and its Optimal Control

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Magnetohydrodynamics, or MHD, deals with the mutual interaction of electrically conducting fluids and magnetic fields. In particular, the magnetic fields interact with the electric currents in the fluid and exert a Lorentz force. This feature renders it so phenomenally attractive for exploitation especially in processes involving liquid metals, and in crystal growth.

We consider the problem of stationary incompressible MHD, and a stable and conforming discretization by finite elements. In addition, an optimal control problem, its necessary optimality conditions and numerical methods for its solution will be presented.

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