LadHyX Seminar — Jan. 18, 10:45

# Caroline Nore (LIMSI)

**Numerical simulation of magnetohydrodynamic problems: application to dynamo action and liquid metal batteries**

We study the generation of magnetic fields by flows of electrically conducting fluids (called dynamo action) and the stability of liquid metal batteries using direct numerical simulations. We have been developing a so-called code SFEMaNS since 2002 [1] capable of simulating the nonlinear magnetohydrodynamic (MHD) equations in heterogeneous domains (with electrical conductivity or magnetic permeability jumps) in axisymmetric geometries and with several fluids. We present in this talk a case of dynamo action obtained in a cylindrical tank [2], namely a model of the von Kármán Sodium experiment (VKS), which could generate a steady or intermittent magnetic field in 2007 [3]. We will also discuss liquid metal batteries that would be less expensive than traditional batteries to store renewable energy produced intermittently and which are developed by a US start-up AMBRI [4]. We investigate a possible instability of these batteries [5].

This project is a collaboration with J.-L. Guermond, J. Léorat, F. Luddens, W. Herreman, L. Cappanera and D. Castanon-Quiroz

Key words : Magnetohydrodynamics, dynamo effect, direct numerical simulation, Multiphase flows.

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