

High-performance multiphysics FEM simulations in the Sparselizard open source library

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This talk demonstrates the capabilities of the open source FEM library Sparselizard (sparselizard.org) through mini-examples focused on the physics of interest for particle accelerator magnets. The equations and simulations are set up on the 3D geometry of CERN's Feather M2 particle accelerator magnet for the following physics:

- ☒ DC electric current flow through the magnet conductor
 - ☒ Static magnetic field including saturation in the iron yoke
 - ☒ Mechanical deformation due to the magnetic field forces
 - ☒ Multiphysics simulation of a quench propagation in the magnet combined with conformal adaptive mesh refinement and interpolation order adaptivity (hp-FEM)
 - ☒ Large scale acoustic wave propagation through the magnet with a high performance domain decomposition algorithm running on a supercomputer
- Because using the Sparselizard library leads to a very compact and concise code the miniexamples can all be described in details down to every single line of code. All mini-examples will be provided online.

Keywords

Category

Electromagnetics modelling of LTS and HTS magnets

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