



Contribution ID: **8** Type: **not specified**

# Upscaling Method Applied to the Study of Superconducting Magnet Thermo-hydraulics

*Friday 14 October 2011 09:00 (30 minutes)*

In the field of applied superconductivity, there is a growing wish to better understand the collective behaviour of the thermo-hydraulics of superconducting magnets. Depending on the specific item to be addressed, either 0-D, 1-D, 2-D or 3-D modelling may be needed. Because of the size of these magnets, in isolation or coupled together, it is already for computational reasons alone not possible to study this numerically without any simplification in the description of the geometry and the physics. The main idea of this study is to consider the interior of a superconducting magnet as a porous medium and to apply methods used in the field of porous media to obtain the equations that model the thermo-hydraulic behaviour of a superconducting magnet in different configurations (steady-state, beam losses, quench,...) with minimal compromises to the physics and geometry. Since the interior of a superconducting magnet is made of coils, collars and yoke filled with liquid helium with channels that interconnect the helium inside the magnet, an upscaling method should provide models that describe the thermo-hydraulic behaviour at the magnet scale and are suitable for numerical studies.

**Author:** Dr ALLAIN, Herve (CERN)

**Co-authors:** Dr BAUDOUY, Bertrand (CEA/Saclay); Prof. PRAT, Marc (CNRS-IMFT); Prof. QUINTARD, Michel (CNRS-IMFT); Dr VAN WEELDEREN, Rob (CERN)

**Presenter:** Dr ALLAIN, Herve (CERN)

**Session Classification:** Session 3: Electromagnetics, Models and Methods