25-10-11 / 28-10-11 Workshop on Numerical Electromagnetics and Industrial Applications (NELIA 2011)

October 25 - 28, 2011
Faculty of Mathematics
Universidade de Santiago de Compostela, Spain

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NEWS: Workshop awarded with 1 ECTS credit for Mathematics & Physics degrees

Presentation

Numerical simulation plays an important role in electrical engineering to optimize the design and operation conditions of a large number of electrical devices such as electrical machines, induction heating systems, microwaves, transformers, etc. The electromagnetic behaviour of these devices is governed by Maxwell equations, which cannot be solved, in general, by using analytical methods. Therefore, to deal with a specific electromagnetic problem, is essential to know the mathematical and numerical tools suitable for its resolution.

Therefore, in the last thirty years, the mathematical and numerical analysis of Maxwell's equations has experimented significant development both in the field of applied mathematics and in electrical engineering. Also, from the computational point of view, in the last decade various commercial codes for solving electromagnetic models based, in general, finite element methods have been developed.

It should also be noted that, in many industrial applications, the electromagnetic models appear coupled with other models (thermal, hydrodynamic, mechanical etc.) and then involve the numerical solution of strongly nonlinear problems. In particular, to address these coupled models is essential to have adequate numerical methods to efficiently solve the Maxwell equations and which mathematical and numerical analysis sustain the viability of the method.

In this context, the main goal of this workshop is to set up a discussion around the recent developments in the mathematical, numerical and computational analysis of electromagnetic models and their direct industrial applications. In particular the following subjects will be raised:

- Formulation of different electromagnetic models under different simplifications in the Maxwell equations (high and low frequencies).
- Numerical and mathematical analysis of the above formulations.

- Modelling of magnetic behaviour of materials.

- Numerical techniques: finite elements, boundary elements etc.

- Coupled problems: thermoelectrical, magnetohydrodynamic, magneto-mechanical etc.

- Industrial applications.

The
talks will be addressed by international specialists in each of the suggested subjects. There will also be participants from industry in order to consider applications that might need the development and resolution of electromagnetic models. In this context, the workshop also intends to open new lines of research in the subject, taking into account the industrial demands nowadays, and also to establish or continue with networking relationships among the participants.