



MARIE Skłodowska-CURIE INNOVATIVE TRAINING NETWORK

OPEN CALL – PhD position



Swansea University
Prifysgol Abertawe



UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

Host (recruiting) organisation

Siemens Magnet Technology, Oxford, UK

Project Title: A high fidelity benchmarking tool in the design and optimisation of MRI scanners

Supervisory team

Primary academic institution Dr. Antonio J. Gil, Dr Paul D. Ledger Swansea University	Industrial institution Dr. Mike Mallett Siemens Magnet Technology
Secondary academic institution Dr. Sergio Zlotnik, Prof. Antonio Huerta Universitat Politècnica de Catalunya · BarcelonaTech	

Project description

Traditional approaches to engineering design employ low order finite element discretisations and traditional approaches to finite element analysis. However, such methodologies require dense discretisations and lead to expensive computations in order to ensure sufficient accuracy for today’s modern designs. The latest developments in finite element analysis offer the possibilities for high levels of accuracy within a computational competitive time scale, but, to date, have not been applied in an industrial context.

In this PhD project the chosen application of interest is a clinical MRI system. Siemens Magnet Technology are interested in understanding the coupled electro-magneto-mechanical response of its conducting components making up an MRI scanner and the effects that changes in its design have on its performance and vibrations. The magnetic coupling between the various components produces secondary magnetic fields which are also coupled back. An accurate prediction of these secondary magnetic fields is essential to predict the impact on imaging performance, especially in three dimensions. To do this, the coupled set of elasticity equations, for describing the mechanical response, and Maxwell equations, for electromagnetic response, must be solved.

This PhD will first develop a computational framework based on advanced hp-finite element technology and efficient algorithms for the solution of resulting non-linear equation system in a transient context. This will help Siemens Magnet Technology to improve its MRI coil designs and comparisons against industrial designs will be undertaken to ensure that the high-fidelity model of a realistic three-dimensional configuration is fully benchmarked. The PhD will become a member of an active research group working on the development and application of computational techniques in coupled problems.



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Benefits

- Doctorate degree from both Swansea University and UPC·BarcelonaTech
- 36 month full-time employment contract
- Additional mobility and family allowances
- Research supervision and training by recognised experts in computational mechanics from academia and industry
- Access to state-of-the-art research and computing facilities
- Training in transversal skills (e.g. communication skills, entrepreneurship)

Prerequisites

- To have a strong undergraduate and MSc degree (or equivalent) in Engineering, Mathematics, Physics or a related field and a good level of English
- To have an enthusiastic attitude to conduct research, being hard-worker and critic
- To demonstrate knowledge of some programming languages such as Matlab and C++

Eligibility

Applicants shall, at the time of recruitment by SIEMENS, be in the first four years (full-time equivalent research experience) of their research careers and have not been awarded a doctoral degree. Full-Time Equivalent Research Experience is measured from the date when a researcher obtained the degree, which would formally entitle him/her to embark on a doctorate, irrespective of whether or not a doctorate is or was ever envisaged.

At the time of recruitment by the host organisation, researchers must not have resided or carried out their main activity (work, studies, etc.) in the UNITED KINGDOM for more than 12 months in the 3 years immediately prior to the reference date.

Duration of the project

The total duration of the project is 36 months.

Obligations of ESRs

- Completion of the Erasmus Mundus Joint PhD programme Simulation Engineering and Entrepreneurship Development (SEED)
- Be highly committed with quality research, training and management. The successful candidate is expected to become a future leader on the development and application of advanced computational methods for industry
- Take part of the mobility programme both in academia and industry
- Participate on the dissemination and outreach activities associated to the project
- Attend international conferences and present the research undertaken
- Contribute to the writing of articles in high impact international journals

Closing date

March 31, 2016

How to apply

www.lacan.upc.edu/AdMoRe

Questions

admore.itn@upc.edu