Postdoctoral Position

Development of numerical tools for sensors placement applied to machine diagnosis

- Starting Date : October 2021 (flexible)
- Duration : 12 months, extendable possibly to two years.
- Location : University of Lille
- Monthly salary : around 2000 euros (after taxes).
- Contact : Zuqi Tang (zuqi.tang@univ-lille.fr)
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- How to apply : Please, send your CV with a list of publications, a short motivation letter.

Context and objective

There is a growing need for Electrical Rotating Machines (ERM) in a wide range of applications: energy production, automotive, marine and aerospace propulsion, machine tools, and medical equipment, etc. Today, in most of these applications ERM reliability, efficiency, performance, energy consumption, and operational safety become critical issues. To tackle these issues, the world of ERM industries faces currently many challenges: from embedded intelligence inside machines to customer requirements for more customized machines, from environmental and government regulations to requirements of Industry 4.0 and other smart factory initiatives. The key to solve these issues is not only to fully consider the factors affecting the operation of ERM at the beginning of the design but also to strengthen the monitoring and analysis during the operation of the equipment and to become more innovative from design and development to the end of the product lifecycle. All these issues clearly indicate that ERM needs to become smarter and smarter which in turn enables the implementation of its digital twin (DT) model. The DT is a virtual copy of the physical system that must represent as much as possible the real behavior of the machine. This approach is becoming for most of industrial organizations the way to digitize industrial assets, systems, and processes to better understand, predict, and optimize industrial performance. The advantages of the DT are not only to replicate the machine and watch its evolution but also to optimize business operations for equipment suppliers and consumers. A key enabling technology to drive the DT implementation is a low cost, easy to deploy sensing methods that monitor diverse physical quantities.

This position is funded by ANR AAPG2020-WISSTITWIN Project, and is a collaboration between three laboratories, namely the L2EP laboratory, the IEMN laboratory, and the IJL laboratory. The recruited researcher will work in the team OMN of the L2EP laboratory, visit regularly the other team and participate in project meetings (usually in Lille). The work may include other travel, e.g., as is normal in the context of scientific training or dissemination activities. With this position, we aim to develop accurate numerical models, based on the Finite Element (FE) method, to study the sensors placement in electrical machines depending on the operating conditions (thermal, vibration, magnetic ...). The goal is to reach the values of the quantities of interest for, on the one hand, improve the conventional machine diagnosis and, on the other hand, develop its Digital Twin (DT). Data assimilation, as well as model correction by deep learning techniques, will be invoked. These developments, while accounting for the sensor implementation constraints, will strongly give the information for the sensors specifications.

Candidate profile

Experience in modelling and applications in electrical engineering or applied mathematics is highly recommended and previous work in numerical analysis, scientific computing or statistics will be highly appreciated. The expected starting date can be as soon as possible.

Etablissement de votre correspondant

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