Research scientist position

"Post-doctorate position in reliability analysis of electrotechnical and structural systems – 18-month contract"

N/Ref: FEM-SAS-2020-216

Company description

FRANCE ENERGIES MARINES (FEM), the national research institute dedicated to Offshore Renewable Energy (ORE), supports the nascent ORE industrial sector with the means and skills that increase competitiveness by mutualizing R&D costs, reducing risks and accelerating the acquisition of data and knowledge. FEM activities are founded on Research and Development projects based on a broad public-private partnership involving large groups, SMEs, regional authorities, advanced research and training institutions and competitiveness clusters, and with the support of the national Investing for the Future program. FEM collaborators are scientifically and technically involved in these projects thanks to their high level of scientific expertise. The headquarters of FEM are located in Plouzané (Brest area), France, with two other sites in Nantes and Marseille.

FEM and its partners (Université de Nantes (scientific coordination), Rte, EDF, Chantiers de l'Atlantique, Innosea, Bureau Veritas) are conducting the MOSISS project which aims at developing innovative MOnitoring Strategies for Innovative Sub-Stations. One specificity of this project is its focus on the techno-economic assessment of technical solutions taking into account the OPerational EXPenditure (OPEX) and maintenance needs driven by several types of strategies (monitoring, inspection, etc.). To derive those costs, the updating of reliability evaluations of the SS system from new data is key as it allows to plan the maintenance strategy and the associated marine operations. This project will apply the methodology to 60 study cases representative of the sites (metocean conditions, depth and distance to shore) and sizes of farms where floating wind turbine arrays are planned to be installed (Atlantic, Mediterranean and Pacific).

The University of Nantes, with the Group TRUST (GeM - UMR CNRS 6183: "Health Monitoring, Reliability and Structural computation"), focus on research and innovation around numerical methods for reliability assessment or uncertainty propagation, identification of stochastic fields and development of sensors and methods for on-site measurements. In the MOSISS project, and together with the IREENA Laboratory, the TRUST group will provide a scientific supervision for meta-modelling, reliability-based maintenance and computation of added value of Electrotechnical & Structural Health Monitoring (E&SHM).

Job description

In the framework of this postdoctoral position, the successful candidate will have to develop the unified approach for Maintenance Optimisation with a focus on the added value of E&SHM:

- Selection of study cases and identification of pertinent parameters / KPIs and associated uncertainties
- Definition of a simplified model for degradation processes
- System reliability with maintenance updating from E&SHM
- Computation Benefit of E&SHM: added value of E&SHM and inspection

This work embraces:

- Definition of the need for monitoring depending of the required performance (Key Performance Indicators) and the consequence. Linking these needs to limit states (Degradation or Extreme)
- Identification of technologies of monitoring and inspection from existing reports and projects with a focus on their reliability and maintenance or service life time
- Proposition of strategies for monitoring with/without redundancy and with/without inspection
- Development of the computational tools for reliability updating from inspection and monitoring, and for maintenance planning based on reliability

Required qualifications and skills

Essential:

- Excellent knowledge of reliability of marine (renewable energy) systems
- Knowledge of structural analysis (mechanics) and electrotechnical aspects
- Code development and programming skills (programming language: Python or similar)
- Writing of reports and publications in scientific journals
- Scientific rigor and critical analysis
- Curiosity, autonomy, organizational skills and pro-activeness
- Appreciation for working in groups in a multidisciplinary approach

Desirable:

- Experience in the domain of monitoring
- Experience with design methods and tools for marine system reliability
- Multidisciplinary and adaptability to new problematics
- Knowledge of MRE systems
- Good communication/redaction skills in English and French

Candidate profile

- Hold a doctorate in statistics, applied mathematics, reliability studies, mechanics or electrical engineering, with strong components of reliability analysis
- Experience in applied mathematics and modelling of random processes for reliability evaluation

Scientific supervision

- Dr Franck SCHOEFS – University de Nantes
  Professor, GEM / IUML, UMR/FR CNRS
- Nicolas GERMAIN
  Manager of the « MRE array layout and network integration » research program – FEM (Marseille and Plouzané)

Practical information

Type of contract: **CDD (Contrat à Durée Déterminée)**
Duration: **18 months**
Starting date: **from February 15th 2021**
Deadline to apply to this position: **December 29th 2021**

The position is mainly located at the University of Nantes (around 70%) with periods of work at France Energies Marines sites (travel expenses will be supported when in FEM sites, according to FEM policy):

Université of Nantes – GeM laboratory
2 rue de la Houssinière
44322 NANTES cedex 03

Please send your CV and cover letter to the following electronic address: contact@ite-fem.org

In case of an expected secondment of the candidate by a member of France Energies Marines, the application should mention the agreement of the present employer.