



1, rue de la Noë
44300 – Nantes
FRANCE

Open permanent position

Senior Research Scientist in ocean engineering (wave-wind-structure interaction for Offshore Wind and Marine Renewable Energy systems, or naval engineering)

Ecole Centrale Nantes

Ecole Centrale Nantes (www.ec-nantes.fr) is one of the top ten French Schools of Engineering, highly selective technical universities awarding M. Sc. Engineering and PhD degrees. It offers a large range of programmes at the graduate and post-graduate levels as well as professional development courses.

Ecole Centrale Nantes hosts more than 2200 students on its campus. It has a staff of 400 including 150 professors, lecturers and research scientists working in its 6 research laboratories.

Research at Ecole Centrale Nantes is carried out in highly competitive internationally recognised laboratories. Ecole Centrale Nantes believes in an interdisciplinary approach and encourages a spirit of adventure to solve 21st centuries' major challenges: Energy transition, Manufacturing, and Health.

Ecole Centrale Nantes is located in the beautiful city of Nantes in western France, 2 hours away from Paris by train.



City of Nantes

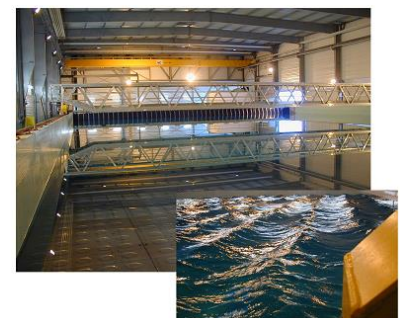


Ecole Centrale Nantes

LHEEA Lab.

The LHEEA (<http://lheea.ec-nantes.fr>), a research laboratory on Hydrodynamics, Energetics and Atmospheric Environment is a joint research unit with the French national research centre CNRS. The LHEEA laboratory has a staff of 145 including 75 professors, lecturers and research scientists with long-term or short-term positions and 35 PhD students. The LHEEA laboratory conducts scientific research in the fields of marine engineering, automotive engines and urban atmosphere. Research is carried out using theoretical, numerical and experimental methods. The LHEEA laboratory operates unique experimental facilities including:

- a large oceanic wave tank: 50 m x 30 m x 5 m basin with 48 independently controlled flap-type wavemakers,
- a 140 m-long towing tank,
- a circulation channel,
- an atmospheric boundary layer wind tunnel: 2 m x 2 m x 20 m, velocity up to 10m/s,
- a low-speed aerodynamic wind tunnel 50 cm x 50 cm x 2.3 m, velocity up to 38m/s.



The wave tank in Ecole Centrale Nantes

The lab is also the founder of a full-scale test site, SEM-REV, dedicated to the testing of marine renewable energy prototypes. The site is located 20kms offshore. It is grid-connected with an 8MW electrical cable, and it hosts the first floating offshore wind turbine in France. Open-C, a newly founded foundation took over its management recently. The LHEEA is also a strong actor in the development of free surface hydrodynamic flow simulation software, either open source or published by major companies. The lab has fundamental academic research activities, but deals also

with applied research, with a quality control approach that complements the usual methods for the scientific approach and integrity.

Job profile

Context – research topics

The energy transition drives new research topics in the field of ocean engineering, specifically in two key categories where the LHEEA aims to further strengthen its knowhow: the development of marine renewable energies and the decarbonization of maritime transportation.

This position of Researcher is therefore open within the IIHNE research team "Interactions and Interfaces in Numerical and Experimental Hydrodynamics". Due to the multitude of needs, different profiles will be considered, those oriented towards naval engineering as well as those oriented towards MREs and floating wind turbines. Similarly, the different specializations in numerical simulation such as CFD, potential solvers, or system approaches are each assets for the position, as is the experimental expertise in particular in the naval field, as an associate professor was recruited in 2020 with a focus on EMR experimentation.

Among the team's topics of interest around the naval industry are the reduction of the resistance (particularly in wave), the hydrodynamic/sail multimodal propulsion, maneuvering and self-propulsion in waves. The numerical activities are multiples: from the development of low-fidelity models (often built on potential flow theory) to high-fidelity ones (resolution of Navier-Stokes equations with CFD solvers). At the experimental level, the tests carried out aim at, e.g., identifying the loadings in extreme sea leading to structural damage of ships, or studying the loadings or movements of ships in waves.

The development of Marine Renewable Energies (MRE), including offshore wind, leads to new challenges in terms of numerical and experimental modelling for the dynamic response of light and flexible structures in the marine environment (numerical and experimental multi-physics simulation and modelling, hydro-elasticity, large space and time scales).

This need is constant in all initiatives and projects in which the team participates, both in terms of

- Low and medium fidelity numerical models: linear and nonlinear potential flow theory (e.g., Nemoh, HOS), Blade Element Momentum, Free Vortex Wake (e.g. OpenFAST, QBlade);
- High fidelity models: RANSE and LES CFD (OpenFOAM).

Context – projects

The school is in a pioneering area for naval engineering, Nantes hosting shipyards for centuries. A number of medium/long-term collaborations are ongoing with major industrial partners such as Bureau Veritas, Naval Group, or CMA-CGM.

The highlights of the last 10 years in MRE and floating wind are the start of the SEMREV sea experimentation site with prototypes, as well as the obtaining of a variety of European (H2020, ITN, Interreg), national (ANR, ADEME, BPI...), or regional projects within the framework of which numerous numerical and experimental activities are carried out. Collaborations are also ongoing with industrial partners such as SAIPEM, BW Ideol or Technip.

The senior research scientist will therefore be integrated into these activities through his/her involvement in ongoing national and European research projects. It is expected that his/ her own skills will allow him/her to accompany the team's ongoing research and to bring new research approaches and methodologies, complementary to the existing know-how. It will progressively contribute to the dynamics of the team in the setting up and management of projects and collaborations, from the regional to the international level.

An excellent junior profile will also be considered.

Role and tasks

The IIHNE research group of the LHEEA laboratory is recruiting a permanent senior research scientist capable of:

- Engage in and then handle parts of the existing projects on the theme of Offshore Wind and Marine Renewable Energy (academic and industrial collaborations);
- Support the development of multi-physics simulation tools for the needs of research on Offshore Wind and Marine Renewable Energy systems;
- Provide expertise in wind-wave-current-structure interactions;
- Develop forthcoming activities, particularly in connection with researchers of other disciplines, such as structural mechanics and control sciences.

The recruited researcher is intended to become in the medium term one of the main contact points for the activities of the LHEEA laboratory. He will support, coordinate, and establish the strategy for the development of numerical activities in this domain.

Skills

The expected skills of the candidate are:

- Scientific expertise at the international level in numerical hydrodynamics, aerodynamics, and/or multi-physics tools.
- An experience in the scientific management of research projects, groups, or networks.
- Research supervision at PhD and/or post-doc level.

The candidate will also demonstrate:

- Initiative,
- Teamwork and communication skills,
- Scientific writing skills,
- Multidisciplinarity.

Keywords

Offshore wind, floating wind, Computational Fluid Dynamics, potential flow solvers, multi-physics coupling, free-surface hydrodynamics, atmospheric flows, ocean engineering

Ship hydrodynamics, experimental modeling, seakeeping, maneuvering, wind-assisted propulsion

Contract

Permanent position. Annual gross salary following national standards, depending on experience. Annual leave: 51 days minimum.

Application process and information

The candidate must hold a PhD and have demonstrated his/her excellence in research. Application (CV + cover letter) should be sent to candidatures@ec-nantes.fr

For more information on the position:

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