

## Title

Numerical simulation of offshore wind turbines and set up of a demonstrator

## Context

The scientific and technological maturity of the marine renewable energies has improved along the last years, and the same trend is observed for floating wind. Several teams participate to this effort at Centrale Nantes, with a lot of different topics of research. The High Performance Computing Institute (ICI) is associated with the Research Laboratory in Hydrodynamics, Energetics and Atmospheric Environment (LHEEA) and with the WEAMEC (West Atlantic Marine Energy Community) in the EOS project ([www.weamec.fr/blog/record\\_project/eos/](http://www.weamec.fr/blog/record_project/eos/)). EOS intends to adapt peak numerical tools developed at ICI to the context of floating wind energy, in order to make high precision numerical techniques affordable for huge wind turbine simulations. This ambitious project uses advanced HPC techniques and tools, such as the supercalculator LIGER at Centrale Nantes.

## Mission

The internship will consist in the development of a massively parallelized platform for the simulation of floating wind turbines, through the study of several configurations and using the developments brought by the EOS project. The simulations will be realized with ICI-tech, a in-house software library, and will be deployed on LIGER. ICI-tech uses adaptive finite elements, a solver suited for multiphase CFD, and is massively parallelized. First simulations will be realized on simplified configurations, and the test case will evolve to tend towards real offshore wind configurations. The objective of the internship is to obtain a behavior of the wind turbine as realistic as possible, and to define the characteristic variables of the flows.

## Skills required

- Knowledge about numerical simulation
- Finite elements
- Fluid dynamics

## Software tools

- C++/object oriented programming
- OS Windows and Linux
- Experience in using a supercalculator is a plus
- LaTeX is a plus