

INTERNSHIP FOR ENGINEERING SCHOOL OR MASTER DEGREE 2024

Study of the effects of waves on vibrations induced in the mast of an offshore wind turbine by numerical modelling integrating fluid-structure interaction

Laboratory :

Laboratoire Universitaire des Sciences Appliquées de Cherbourg (LUSAC)
Team : Flows and Environnement

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Renewable marine energy is a very important source of energy. Marine wind resources are one of them. The first wind farm was inaugurated in 2022 off Saint Nazaire. It will be closely followed by wind farms in the Bay of Seine and the Bay of Saint Brieuc. The development of offshore wind turbines is now in the industrial phase. However, there is still research to be done on this subject. The aim of the DRACCAR project is to study the interactions of a measuring mast installed in the Baie de Seine with its direct environment (waves, wind, current, sediment transport).

This study is part of that context and project. It concerns the study of the effects of waves on the vibrations induced in the mast of an offshore wind turbine using numerical modelling incorporating fluid-structure interaction. The aim is to set up a numerical model that will enable this study to be carried out. The preferred model is the OpenFoam opensource model for calculating wave propagation in the channel, combined with a structural finite element code for calculating deformations in the mast structure. A coupling code will be used to perform implicit coupling between the fluid and structural codes. This work builds on previous work by the group (Khouf et al., 2023, Brousseau et al., 2021, 2022).

KEY WORDS : MARINE RENEWABLE ENERGY, Offshore Wind Turbines, Fluid Structure Interaction, Numerical simulation, free surface flow.

Profil:

Training in fluid mechanics and experience in numerical modelling.
Curiosity, autonomy, good writing skills.
Interest in pursuing a PhD.

DATES AND DURATION:

Starting in February/March 2025 for a duration of 6 months.

Gratification : ~620 €/mois (4.35 €/heure net)

To apply: send a CV and covering letter to sylvain.guillou@unicaen.fr

References :

Khouf L., Benaouicha M., Seghir A., Guillou S. (2023), Numerical modeling of liquid sloshing in flexible tank with FSI approach, World Journal of Engineering, Vol. 20 No. 1, pp. 131-142. <https://doi.org/10.1108/WJE-03-2021-0125>
Brousseau P., Benaouicha M., Guillou S. (2021), Hydrodynamic efficiency analysis of a flexible hydrofoil oscillating in a moderate Reynolds number fluid flow, Energies 14(14), 4370. <https://doi.org/10.3390/en14144370>
Brousseau P., Benaouicha M., Guillou S. (2021), Fluid-Structure Interaction effects on the deformable and pitching plate dynamics in a fluid flow, Applied Ocean Research Volume 113, August 2021, 102720.