

PhD Position - BOPTIC

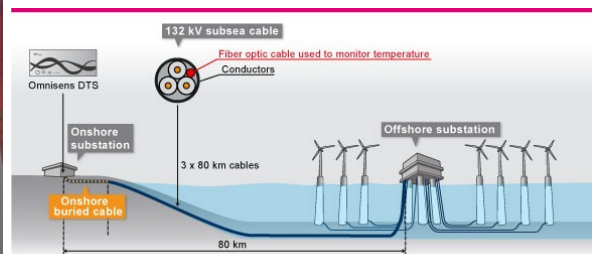
Research Topic	Monitoring of offshore power cables and foundations by Distributed Fiber Optic Sensing
Institute	Ghent University, Belgium
Departments	EEMMECS - Dept. of Electrical Energy, Metals, Mechanical Construction, and Systems
Research Group	Fracture Mechanics, Soete Laboratory.
Funding	4 years – 100% occupancy rate
Statute	PhD Student
Min. Requirements	Master of Science in Mechanical or Civil Engineering.

Job description

Context. Over 55% off all insurance claims to offshore wind farms are incurred by damaged cables and foundations. Moreover, the severity of these failures and associated repair costs result that these claims represent more than 90% of the total claims. Online monitoring is seen by the offshore wind industry as one of the main solutions to decrease the number of damages in cables and foundations, through their early detection and identification. Fiber optic technology is chosen as the preferred monitoring technique as it is very versatile (i.e. sensitive to temperature, strain, impact, partial discharge activity, ...). The wide application of fibre optic sensing, however, lacks maturity as only temperature sensing on cables (DTS technology) and strain sensing on foundations (FBG technology or classical strain gauge technology) is common practice in offshore wind.



Offshore high voltage cable. Optical fibre is positioned in a white tube.



Goals. The BOPTIC project will address the need of offshore wind developers and operators to reduce the operational expenses of the Balance of Plant (BOP) by the development of innovative monitoring technologies for both the cables and foundations using emerging distributed optical sensing technologies. This research project wants to investigate in depth how to use distributed optical sensing techniques to:

- (1) Monitor strain and bending in offshore power cables during installation and operation
- (2) Monitor strain and bending moments of monopiles with high spatial resolution during their lifetime for hotspot location and seabed evaluation
- (3) Detection and Monitoring of electrical faults of an offshore power cable during operation.
- (4) Detection and Monitoring of cracks on welds of offshore structures during their lifetime

This project is initiated by 9 different stakeholders of the Blue Energy including 3 research institutions: Marlinks, 24Sea, ENGIE Laborelec, IMDC, Com&Sens, Parkwind, OCAS, VUB and UGent. Laboratory Soete of UGent will be mainly involved in tasks related to goals (1) and (4).

Concretely, we will contribute to the following activities:

- development of numerical mechanical models to describe the relation between the deformation of the cable (axial, bending and torsion), the position of the optical fibre (movement of a 'loose' fibre in relation to cable movement) and the distribution of strain along the fibre
- laboratory scale experiments and assistance in large scale experiments (static and fatigue): evaluate relation of bending deformation of the cable and strain in the optical fibre
- assistance in experiments for weld crack detection and benchmarking against other NDT techniques
- data pre- and post-processing for interpretation of optical fibre measurements and translation into relevant engineering parameters

Profile

1. You hold a Master of Science degree in Mechanical or Civil Engineering.
2. You have a strong motivation for conducting scientific research at a high level.
3. You possess good analytical and technical skills.
4. You are interested in both experimental and numerical activities.
5. You are interested in mechanical behaviour of structural components, monitoring techniques and offshore wind energy.
6. Experience with finite element analysis and programming in python, Matlab or equivalent are advantages.
7. Experience with setting up and conducting experiments is also an advantage
8. You take responsibility for the development of your project in a well-structured, thorough way, and you're able to solve problems independently. You display creativity in solving problems, generating ideas or finding new ways of working.
9. You have an open personality and willing to contribute to the team and participate in didactic projects.
10. You have excellent communication skills in English, both orally and written.

Contract

1. The PhD-project starting date is still to be defined.
2. We offer an 100% research position for 48 months (4 years). After a probation period of 12 months, a fixed-term contract will be offered on condition of positive evaluation.
3. The salary and appointment terms are consistent with the current rules for PhD degree students. The net salary for a starting PhD student (unmarried) is about €2000,-.
4. The scholarships for the PhD degree are subject to academic approval. The successful candidate will be enrolled in the doctoral program of Ghent University (<http://www.ugent.be/doctorschools/en>).

Application

For further information on the project and/or application, please contact Prof. Wim De Waele (wim.dewaele@ugent.be).

To apply, please complete the application form you find at https://www.ugent.be/ea/eemecs/en/research/soete/vacancies/applicationform/at_download/file and send it in pdf format to the former email address. Your application will be taken into consideration on condition that all fields in the application form are completed properly.