



SUJET DE THESE / PHD POSITION OFFER

University College Dublin - Université de Nantes / GeM
Supported by MaREI

Titre de la thèse / PhD title

*Integration of Wave-Structure Interaction with Biological Growth on Offshore
Cables*



Contexte et contenu scientifique / Project Summary

This project will fundamentally investigate how offshore cables – specifically, mooring lines and umbilicals for offshore renewable energy devices, can be better understood in terms of lifetime behaviour in harsh environmental conditions and related biological growth over time. The biofouling and marine growth of cables can significantly alter the hydrodynamic effect of these cables, and being a fundamentally nonlinear structure in operation, this problem is extremely challenging, poorly understood, requires extensive interdisciplinary knowledge and has far reaching consequences and impacts. In particular, the project will consist of 4 definite scientific work packages:



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WP1: A comprehensive integration of biofouling and marine growth types (species), their clustering and growth patterns to obtain a realistic spatio-temporal evolution of such growth on mooring lines and umbilicals.

WP2: Development of a detailed numerical evidence base on the interaction between waves stochasticity, cable nonlinearity (geometric and material) in operational and extreme circumstances and the spatiotemporal biological effects. Software and differential equation driven models will be used. This will involve extensive hydrodynamic analyses.



WP3: Understanding sensitivities of various biological growth patterns and species to performance measures of cables over lifetime. Performance measures will include both durability and structural failure aspects. The concept of structural reliability will come here by establishing the design points and



parameter importance measures. Effects of climate variability in terms of biological growths will also be discussed.

WP4: Application of the developed insights to real/realistic scenarios on data obtained from various campaigns of testing in sea. This will make the insights developed from the PhD close to the industrial needs and to be exploited in future.

Compétences clés / Key competences

Probabilistic modelling,

Numerical simulation ;

Passion for inter-disciplinarity (biology, mechanics).

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