Candidate Information

Position:	Research Fellow
School/Department:	Civil Engineering
Reference:	22/110534
Closing Date:	Monday 23 January 2023
Salary:	£35,333 per annum
Anticipated Interview Date:	Monday 6 February 2023
Duration:	45 months or until 31 December 2026, whichever is sooner.

JOB PURPOSE:

To be a highly productive, ambitious and collaborative member of LEAP HI: U.S.-Ireland R&D Partnership: Control Co-Design for Ocean Wave Energy Conversion [CoWEC] research project/team to deliver the project tasks specifically in fluid-structure-interactions using computational fluid dynamics (CFD), potential flow solvers, model and field testing and validation of numerical analysis versus experimental results.

The post is a critical role, and as such, successful applicants will have responsibilities in independent research, numerical analysis and code development, model testing and lab experiments, collaborations, reporting, dissemination, publication and outreach.

The key objectives of the overall research programme are to support the development of wave tank validation, Ocean demonstration and hydrodynamic models of different fidelity (CFD and potential solvers). This is to support the Wave capture structure co-design and validation of numerical tools using experiments by performing wave tank experiments at QUB and field ocean testing.

This research job focuses on three streams of Numerical analysis of Wave energy converters (WECs), Model wave tank experiments and Ocean field testing as follows:

• Development of frameworks for Boundary Element Method and Finite Volume Computational Fluid Dynamics (CFD) methods for investigation Wave capture structure co-design subjected to ocean waves.
• Numerical analysis and simulations of Ocean Wave Energy Conversion (WEC)
• Calibration and validation of numerical methods using data obtained by wave tank model experiments and field testing.
• Design, planning and carrying out wave tank model testing of the wave energy converter. This should include synchronised wave, motion and load data acquisition.
• Post-processing and reporting the model testing from Wave Tank Experiments for investigation and benchmarking of existing system characteristics in parallel with Physical Ocean testing.

MAJOR DUTIES:

1. Undertake research under the supervision of PI (principal investigator) as a member of a research team LEAP HI: U.S.-Ireland R&D Partnership: Control Co-Design for Ocean Wave Energy Conversion [CoWEC].
2. Be an active research member of the project QUB research team with the aim of delivery of the project objectives and contributing to the wider goals of the US-Ireland consortium.
3. Design, develop and refine research using a range of experimental models: Wave tank model experiments and ocean field testing.
4. Develop frameworks for Boundary Element Method and Finite Volume Computational Fluid Dynamics (CFD) methods for investigation Wave capture structure co-design subjected to waves.
5. Numerical analysis and simulations of Ocean Wave Energy Conversion (WEC).
6. Carry out analyses, critical evaluations, and interpretations of experimental data and the literature using ocean engineering methodologies and other techniques appropriate to area of research, for example, design engineering codes based on potential flow solvers (e.g. WAMIT) and Computational Fluid Dynamics (CFD) such as OpenFOAM.

7. Support the verification and validation of the suite of numerical models under development to accurately predict the motions and loading of WEC designs.
8. Produce high-quality research outputs consistent with project aims and commensurate with the career stage. This will include collaborating, writing and co-authoring with the PI (Principal investigator) and the project team (US-Ireland) on outputs.
9. In consultation with the project team, promote research milestones and outputs at national and international conferences and through social media with the agreement of the supervisor.
10. Present regular progress reports on research to project partners, members of the management team and external audiences to disseminate and publicise research findings under the supervision of the PI.
11. Assist PI (grant holder) in the preparation of funding proposals and applications to external bodies.
12. Carry out occasional educational supervision, demonstrating or lecturing duties within the post holder's area of expertise under the direct guidance of the PI.
13. Undertake supplementary duties relevant to the success of the project including administrative duties and additional training and development activities as required.
14. Disseminate the results of the research within the sector through the presentation of conference papers and attendance/presentations at seminars and exhibitions etc. in consultation with the supervisor.
15. Writing journal papers in consultation with the supervisor in high-impact factor journals in the field of marine/offshore/ocean engineering.
16. Assist the academic supervisor with administrative tasks associated with the project and reporting to funders to ensure it is completed on time and within budget, e.g. organisation of project meetings and documentation, risk assessment of research activities. These include the organisation of project meetings and documentation, financial control, risk assessment of research activities.
17. Review and read academic papers, journal and textbooks to keep abreast of developments in own specialism and related disciplines.

ESSENTIAL CRITERIA:

1. Have a PhD in Naval Architecture, Ocean/Offshore engineering, Coastal and marine engineering, Mechanical or Civil Engineering.
2. At least 3 years recent relevant research experience in Marine engineering or Offshore/Ocean engineering with proven experience of research methods & techniques used in established research programmes including:
   • Undertaking research in the area of numerical analysis (potential flow solvers and computational fluid dynamics) for offshore renewable energy structures
   • A proven track record of using wave tank model testing and experimental models to carry out analyses, critical evaluations, & interpretations of experimental data relevant to the research project
   • Working effectively as part of a research team in the development and promotion of the research theme
   • Recent relevant research experience in hydrodynamic and fluid-structure-interaction, marine dynamics.
3. Evidence of a strong publication record in high-ranked international journals of ocean, offshore and marine engineering commensurate with career stage and experience.
4. Sufficient breadth and depth of specialist knowledge in the offshore renewable energy field and research methods and techniques in Wave energy converters.
5. Previous experience in managing projects, deliverables, and finances.
6. Proven skills in working with research partners.
7. Ability to communicate complex information in English effectively in oral and written format.
8. Ability to build relationships to develop internal and external networks.
9. Commitment to continuous professional development.
10. Demonstrable intellectual ability.
11. Proven ability to assess and organise resources to ensure delivery to project milestones.
12. Ability to meet the travel requirements of this post: national and international travel and site visits.

DESIRABLE CRITERIA:

1. Wave tank model testing, Fluid-Structure-Interaction and/or Hydrodynamic analysis of Wave energy converters as part of PhD subject.
2. One-year post-doctoral experience in the analysis, model testing and design of marine structures.
3. A proven track record in wave energy converter (WEC): design, assessment, testing and numerical analysis of these structures.

4. Proven experience of working on an industry lead project or project with considerable industry input, working in a multi-institutional and interdisciplinary team.
5. Previous experience in model testing and wave tank experiments, using data acquisition, data analysis and post-processing tools.
6. Track record of real world physical testing of marine engineering structures for the validation of numerical models.