ULPGC
Instituto Universitario de Sistemas Inteligentes y Aplicaciones Numéricas en Ingeniería
SIANI

GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN
AGENCIA ESTATAL DE INVESTIGACIÓN

Job Position

In the framework of the research project:

ANN-based design of the support structures of offshore wind turbines including advanced models of soil-structure interaction and seismic actions (NEURALWIND) (PID2020-120102RB-I00/AEI/10.13039/501100011033)

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One of the challenges our society faces in the short term is the development of a system of energy production less dependent on fossil fuels. The generation of electric energy from wind is one of the technologies that will allow to tackle this challenge, being offshore wind one of the options with largest potential. In this scope, and even when floating devices have experienced a great development in the last years, the majority of offshore wind turbines installed nowadays are directly founded to the seabed. The support structure in these cases can consist on one single vertical element (tower) connecting wind turbine and foundation, or on a three-dimensional structure with several legs (jackets, tripods) founded on piles or suction buckets. These support structures represent a mechanical problem of great interest and present relevance because the expansion of wind energy would benefit from better designs that allow to place the turbines at larger sea depths and, consequently, also larger distances from shore. In this regard, this research project aims at developing methodologies and tools that allow to design and characterize support structures of offshore wind turbines. The aim is for these methodologies to be able to help to find designs that not only comply with the structural requirements existing for these cases, but also lead to more resilient solutions, at lower economic cost, with a larger lifespan and, therefore, can contribute to reduce the levelized cost of energy of the technology. More precisely, the aim is the development of computational methodologies based on Artificial Neural Networks that allow to design and characterize these support structure as a function of the environmental loads (waves, currents and winds), the characteristics of the location (depth and geotechnical properties of the seabed) and seismic loads, when relevant. It is also an objective to analyze two aspects that are not sufficiently studied in the scientific literature and that can determine the structural designs in zones with relevant seismic risk: the dynamic foundation-soil-foundation interaction phenomena that arises in structures with multiple foundations, and the analysis of the influence of kinematic interaction on the seismic response of the systems.

This project is a continuation of two previous research projects, financed also by the Spanish Research Plans, that allowed to develop numerical models aimed at the study of the dynamic response of these structures. These models, that take into account all the main components of the problem (including seabed, foundation, support structure and tower) and their mutual interactions, will be integrated in the proposed methodology, and will also work as one source of the necessary data for building and training the artificial neural networks.

The resulting tools will allow to carry out studies with the aim of inferring useful knowledge and information, including the definition of sets of structural properties and typologies as a function of the characteristics of the problem, which could allow to find underlying factors influencing the

response and designs of these structures. In short, the objective is being able to generate practical knowledge that, adequately processed, can contribute to obtain better designs for the support structures of the future offshore wind turbines.

In the framework of this proyect, the Continuum Mechanics and Structures Division of the University Institute for Intelligent Systems and Numerical Applications in Engineering (Instituto Universitario SIANI. Parque Científico y Tecnológico del Campus Universitario de Tafira, 35017, Las Palmas de G.C.) is currently looking for a motivated candidate, holding a Master of Science degree in the fields of engineering, physics, mathematics or computer sciences, with knowledge in programming and numerical methods. Students that plan to finish soon their Master of Science studies are also welcome. Other skills that can also be taken into account are: knowledge in Fortran and Matlab programming; experience in the development of open-source scientific software, and good English skills. The tasks will include coding models and methods developed in the framework of the project, verification and validation tasks, running cases and studies, and preparing codes for publishing as open-source codes.

The duration of the contract is 18 months, with a brute salary of 1558,93 € /month.

Interested candidates can contact Juan José Aznárez (juanjose.aznarez@ulpgc.es) and Luis Padrón (luis.padron@ulpgc.es). Applications must be submitted before 4th July 2022 through the electronic platform (https://administracion.ulpgc.es) of the University of Las Palmas de Gran Canaria through a generic instance addressed at Instituto Universitario SIANI.

Applications are invited for a job position (18 months) at Instituto Universitario SIANI, Las Palmas de Gran Canaria, in the frame of the research project ANN-based design of the support structures of offshore wind turbines including advanced models of soil-structure interaction and seismic actions (NEURALWIND) (PID2020-120102RB-I00/AEI/10.13039/501100011033).

Submission deadline: 4th July 2022
Please see further details in the attachment.