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Title

Virtual Prototyping of Installation of Offshore Power Systems

Short project description

The industries, houses, and transportation equipment are producing extensive amounts of emissions, therefore, they are threatening the living species by polluting the planet. To reduce emissions and protect the environment, it is required to utilize cleaner sources of energy such as wind. Wind turbines are designed to convert wind energy into electricity and can be located onshore and offshore. The wind velocity is higher and more stable at the sea and it increases the production potential of Offshore Wind Turbines (OWTs) while project costs are considerably higher than the inland structures.

Installation of offshore wind turbines is a challenging operation and that is mainly due to complexities in the environment such as waves, winds, and currents. Besides, there are multiple structures involved in these operations such as OWT assembly, lifting vessel, floating spar, etc. (depending on the installation arrangement). The response of each of these structures to the environment and interaction between them is cumbersome which increases the complexities in the operation. In the current research, the main focus will be on understanding the underlying physics and the way the competitive advantage of this technology can be increased.

Industrial Goals

- 1- Knowledge transfer from offshore oil and gas industry and implement in OWT installations.
- 2- Development of innovative concepts for OWT installation operation to increase efficiency.
- 3- Development of a unified virtual prototyping environment following Functional Mock-up Interface standard.

Scientific questions

- 1- What are the main physical phenomena governing OWT installations?
- 2- How these phenomena can be defined numerically that is possible to integrate into different simulation environments?

Innovations

Conventional installation methods in this field are not efficient and there is a demand for innovative installation concepts. The development of a unified simulation environment increases the flexibility of the operation while reduces error.

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