

The use of iDL (Intelligent DockLocking system) for maintenance operations in offshore wind farms

The aim of this thesis is to assess the feasibility of an iDL (Intelligent Docklocking system), an automated magnetic mooring system (AMMS), for the transfer of crew from a crew transfer vessel (CTV) to an offshore wind turbine. The study includes an analysis of the operability and an estimation of the design requirements of an iDL for crew transfers.

Currently, a fender system is used for this purpose. This connection relies on friction forces between the vessel and turbine and as a result the fender can start sliding without notice. This induces safety hazards and damage to the fenders. These problems can be solved with an AMMS.

A frequency domain model is derived and used to simulate the dynamics of the CTV and its connection to the wind turbine. After optimizing the characteristics of the iDL system, the technical feasibility is determined by examining the maximum probable movements that are allowed. In addition, Monte Carlo simulations are conducted to evaluate the required maximum magnet strength.

The results of this study indicates that an AMMS is able to limit the motions within the allowable values, while the required structure and amount of magnetic force seem achievable on a 2610-Damen vessel.

The results look promising, however, more comprehensive research is recommended.

Firstly, a time-domain analysis can be used evaluate the transient behaviour of the system and possible non-linear behaviour. Finally, it is recommended to manufacture a prototype to evaluate the economic feasibility.

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