

DYNAMIC CHARACTERISTICS OF FLOATING OFFSHORE STRUCTURE SPAR-TYPE WIND TURBINES UNDER REGULAR AND IRREGULAR WAVES

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ABSTRACT

Egypt is one of the best places in the world to find wind power. With wind speeds at average 8.5 to 10 m/sec, Egypt is at the forefront in the region in terms of wind power. In this investigation a Spar-Type offshore structure equipped with 5MW wind turbine have been considered. The dynamic motion responses are critical for designing the substructures of Spar-Type wind turbines. All environmental loads from waves and wind have been considered in this investigation. The available data for the Gulf of Suez area from the Egyptian Meteorological Authority was used to determine the environmental loads. For the dynamic study, the analysis software ANSYS-AQWA was used to determine out the hydrodynamic properties, FAST simulation software for wind turbine, and MATLAB software for the spectral analysis. The results of the investigation help to better understand the stability and dynamic response of Spar-Type wind turbines. Time history, Power Spectrum Density, and phase plan are included in the results.

KEYWORDS: Off Shore Wind Turbines, Spar-Type Offshore Stru Cture, Wave Forces, Wind Forces, Coupled Analysis, Dynamic Response

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