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離岸風力發電支撐結構之安全性分析
Security Analysis of Jacket Substructures for Offshore Wind Turbines

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摘要

　　近年來綠色能源越來越被重視，而風力發電占有相當的比例，穩定風場的腹地與噪音問題為考量重點，所以離岸風電成為一個解決方法。本研究計畫主要係探討四種離岸風力桁架支撐結構，建造在台灣海峽時的安全性分析，比較結構強度與二十年運行時間內結構疲勞壽命預估。利用有限元素軟體，建立四種高度適合台灣海峽的支撐結構。藉由時域性分析取得應力訊號，利用雨流記數法計算應力範圍，並且依據 DNV 規範計算應力集中係數與 S-N 曲線，經由Palmgren-Miner 理論計算破壞率，即可得到預估疲勞壽命。本研究也比較台灣颱風狀況下，四種支撐結構強度比較，並且探討考量慣性效應與否的差別。

關鍵詞：離岸風力發電、安全性分析、破壞率、疲勞壽命

Abstract

　　People placed great emphasis on the Green Energy recently, and wind power had a place, steady wind and noise were an important issue, so offshore wind turbine became a solution. In this research, we discussed the security analysis for four kinds of jacket substructures for offshore wind turbines which was constructed in Taiwan Strait, comparing the structure strength and fatigue life in the 20 years of operation.Four models which were suitable for Taiwan Strait were created in the finite element analysis software. Time-domain analyses were conducted for the stress, and calculated stress range by Rainflow-Counting and obtained stress concentrate factor and S-N curve by DNV Standard, so we could get cumulative Damage by Palmgren-Miner's rule and fatigue life. The research also compared the structure strength of this four structure in the typhoon condition with and without inertia effect.

Keywords: Offshore Wind Turbine, security, cumulative Damage, Fatigue life