비정상 와류격자 기법을 이용한 해상용 부유식 풍력발전기의 공력하중특성

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The wind can be stronger and steadier further from shore, but water depth is also deeper. Then bottom-mounted towers are not feasible, and floating turbines are more competitive. There are additional motions in an offshore floating wind turbine, which results in a more complex aerodynamics operating environment for the turbine rotor. Many aerodynamic analysis methods rely on blade element momentum theory to investigate aerodynamic load, which are not valid in vortex ring state that occurs in floating wind turbine operations. So, vortex lattice method, which is more physical, was used in this analysis. Floating platform's prescribed positions were calculated in the time domain by using floating system RAO and waves that are simulated using JONSWAP spectrum. The average value of in-plane aerodynamic force increase, but the value of out-of-plane force decrease. The maximum variation aerodynamic force abruptly increases in severe sea state. Especially, as the pitch motion of the barge platform is large, this motion should be avoided to decrease the aerodynamic load variation.

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Key words : floating wind turbine(부유식 풍력발전기), aerodynamic load(공력 하중), sea state(바다 상태)

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대형 풍력발전기 블레이드의 광대역 소음 신호 예측 및 분석

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Prediction of broadband noise signal from a large wind turbine

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This study predicted broadband noise from a generic 2.5MW wind turbine blade in the time domain. The rotor blade was modeled as thin rectangular flat plates. A simplified analytic model proposed by Amiet was used to model the unsteady surface pressure distribution. The acoustic pressure was calculated by using the loading term of Formulation 1A proposed by Farassat. The validation was also performed by comparing with an experiment of Brooks, Pope, and Marcolini. By using these numerical methods, the broadband noise signal of the wind turbine was successfully predicted in this study.

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