풍력터빈 시스템 성능평가를 위한 NREL 프로그램군에 관한 소개 – 해석기를 중심으로

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Introduction to the NREL Design Codes for System Performance Test of Wind Turbines - Part II : Simulators

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NREL NWTC Deside codes are analyzed and introduced to develop the system performance simulation program for wind turbine generator systems. In this paper, The FAST performing multi-body and flexible body dynamics, control and the AeroDyn calculating aerodynamic forces with airfoil data and wind data are explained. Furthermore, initialization and process for transfer of aerodynamic force between AeroDyn and FAST at each time step are also introduced.

Key words : Wind Turbines(풍력터빈), System Performance Test(시스템 성능 평가), FAST, AeroDyn, ADAMS/WT, Linearization(선형화)

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대기 안정 상태에 따른 풍력 단지 소음 전파 예측

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Prediction of Wind Farm Noise with Atmospheric Stability

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Noise generated from wind turbines has been predicted by numerical methods. Sound pressure level(SPL) on the turbines is predicted after aerodynamic analysis is carried out by Wind Turbine Flow, Aeroacoustics and Structure analysis (WINFAS) code. The level of each panel of acoustic sphere is determined by the sum of tonal, turbulence ingestion and airfoil self noise. With the noise source database, the acoustic sphere, SPL on the ground is calculated using the model based on acoustic ray theory. The model has been designed to consider the effects on the condition of terrain and atmosphere. The variations of SPL on the ground occur not only because of the different source level but also because of the nonuniform distributions of the sound speed along the height. Hence, the profile of an effective sound speed which is the sum of the contribution of sound speed to a temperature gradient and a wind speed variation is used by the theory based on atmospheric stability. With the integrated numerical method, the prediction of sound propagation on the wind farm is carried out with the states of the atmospheric stability.

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Key words : Wind farm(풍력단지), Noise(소음), Atmospheric stability(대기 안정성), Acoustic ray theory(음향 음선 이론)

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