## 해상 풍력 발전 Jacket 지지구조물의 X-joint 응력 집중 현상

*이 주상, **박 현철, Shi wei, 이 종선, 백 재하

## X-joint stress concentration of offshore wind turbine jacket support structures

*Jusang Lee, **Hyunchul Park, Shi wei, Jongsun Lee, Jaeha Beak

Due to less turbulence and no land limitation, offshore wind energy gets more attention than onshore. Jacket structure is regarded as a suitable solution for the water depth ranging from 30 to 80 meters. In general, joint stress concentration of jacket support structures affects their fatigue life. Nowadays, most jacket structures for offshore wind turbines have tubular X-joint between legs. In this paper, a study on X-joint stress concentration of offshore wind turbine jacket structure is performed by using 50m water depth model. Stress of X-joint on offshore environmental conditions are discussed.

**Key words :** Offshore wind energy(해상풍력), Jacket foundation(재킷 기초), Stress concentration(응력 집중)

**E-mail :** *jusang@postech.ac.kr

## CFD를 이용하여 건물 외피의 바람에너지에 관한 적용연구

*정 영배

## A Basic Study for Wind Energy of Building Cladding using Computational Fluid Dynamics

*Yung-Bea Chung

The new and renewable energy today has a great interest in all countries around the world. In special it has need more limit of the fossil fuel that needs of low carbon emission among the social necessary conditions. Recently, the high-rise building demand the structural safety, the economic feasibility and the functional design. The high-rise building spends enormous energy and it satisfied the design in solving energy requirements. The requirements of energy for the building depends on the partly form wind energy due to the cladding of the building that came from the surroundings of the high-rise building. In this study of the wind energy, the cladding of the building was assessed a tentative study. The wind energy obtains from several small wind powers that came from the building or the surrounding of the building. In making a cladding the wind energy forms with wind pressure by means of energy transformation methods. The assessment for the building cladding was surrounded of wind speed and wind pressure that was carried out as a result of numerical simulation of wind environment and wind pressure which is coefficient around the high-rise building with the computational fluid dynamics.

In case of the obtained wind energy from the pressure of the building cladding was estimated by the simulation of CFD of the building. The wind energy at this case was calculated by energy transform methods: the wind pressure coefficients were obtained from the simulated model for wind environment using CFD as follow. The concept for the factor of $E_f$ was suggested in this study.

$$C_p = \frac{P_{surface}}{0.5\rho V^{2_{ref}}}$$

$$E_c = C_p \cdot E_f$$

Where $C_p$ is wind pressure coefficient from CFD, $E_f$ means energy transformation parameter from the principle of the conservation of energy and $E_c$ means energy from the building cladding.

The other wind energy that is $E_p$ was assessed by wind power on the building or building surroundings. In this case the small wind power system was carried out for wind energy on the place with the building and it was simulated by computational fluid dynamics. Therefore the total wind energy in the building was calculated as the follows.

$$E = E_c + E_p$$

The energy transformation, which is $E_f$ will need more research and estimation for various wind situation of the building. It is necessary for the assessment to make a comparative study about the wind tunnel test or full scale test.

**Key words :** Computational Fluid Dynamics(전산유체역학), Building Cladding(건물 외피), Energy transformation(에너지변환), High-rise Buildings(고층건물), Wind Energy(바람에너지)

**E-mail :** *ujuchung@naver.com