Journal of Biomolecules and Biochemistry

Abstract

Defining the turbulent coefficients with the effect of atmospheric stability in wake of a wind turbine wake

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Abstract:

Wind energy is one of the cleanest form of renewable energy. Despite wind industry is growing faster than ever there are some roadblocks towards the improvement. One of the difficulties the industry facing is insufficient knowledge about wake within the wind farms. As we know energy is generated in the lowest layer of the atmospheric boundary layer (ABL). This interaction between the wind turbine (WT) blades and wind introduces a low speed wind region which is defined as wake. This wake region shows different characteristics under each stability condition of the ABL. So, it is fundamental to know this wake region well which is defined mainly by turbulence transport and wake shear. Defining the wake recovery length and width are very crucial for wind farm to optimize the generation and reduce the waste of power to the grid. Therefore, in order to obtain the turbulent coefficients of velocity and length, this research focused on the large eddy simulation (LES) data for neutral ABL (NABL). According to turbulent theory, if we can present velocity defect and Reynolds stress in the form of local length and velocity scales, they become invariant. In our study velocity and length coefficients are 0.4867 and 0.4794 respectively which is close to the theoretical value of 0.5 for NABL. There are some invariant profiles because of the presence of thermal and wind shear power coefficients varied a little from the ideal condition.

Biography:

Mohammad Asif Sazzad has completed his MS from University of Texas at San Antonio. He worked at John Deere for around Three years. Recently he has joined Ford Motor Company.

Publication of speakers:

1. Hecht SS, Hoffmann D. Carcinogenesis, 1988; 9: 875-884.
2. Li SH, Shi CL, Wang YZ, Sun XD, Qi DW, Wu D, Wang Y, Zhu JH. Microporous Mesoporous Mater. 2019; 284: 393-402.
3. Shi CL, Li SH, Sun XD, Wang ZP, Wang YZ, Xiong JW, Gu WB, WANG WM, Yao HM, Wang Y, Zhu JH. Chem. Eng. J. 2018; 339: 170-179.
4. Sun XD, Lin WG, Wang LJ, Zhou B, Lv XL, Wang Y, Zhen SJ, Wang WM, Tong YG, Zhu JH. Microporous Mesoporous Mater. 2014; 200: 260-268.

Citation: Mohammad A. Sazzad; Defining the turbulent coefficients with the effect of atmospheric stability in wake of a wind turbine wake; Renewable Energy 2020; October 26, 2020; London, UK