

AERODYNAMIC ANALYSIS ON WIND FARM IN NON-NEUTRAL ATMOSPHERIC CONDITIONS

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Analysis of aerodynamic performance of a wind turbine in wakes has been conducted to find out optimal turbine spacing. The estimation about Ainslie's model in a stable and an unstable atmospheric condition was carried out by Bernhard Lange et al (2003). However, since results of the power output in wakes are using power curve with average wind speed, the model could not follow the measurements in multiple interactions of the wakes. Therefore, in this paper, the performance at the downstream turbine was analyzed by vortex lattice method (VLM). The wake profiles in non-neutral conditions were predicted by the extended eddy viscosity model which is able to calculate the velocity distribution on the rotor plane. In addition, the influence of the turbine spacing was analyzed. The results were shown that the spacing between the first turbine and the second turbine was the most important to entire farm efficiency (Fig. 1). The better solution can be obtained when the spacing between the others is uniformly distributed.

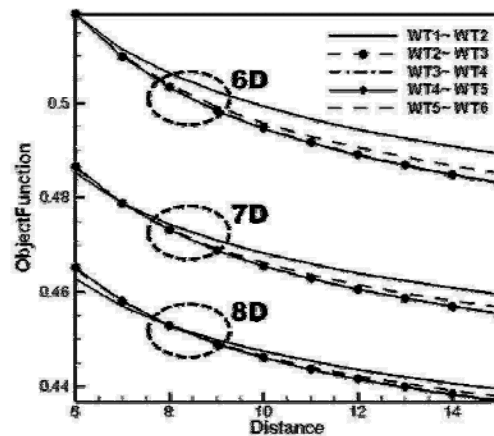


Figure 1. Contribution of the turbine spacing to the object function.

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