Considering induction factor using BEM method in wind farm layout optimization - DTU Orbit (26/09/2019)

**Considering induction factor using BEM method in wind farm layout optimization**

For wind farm layout optimization process, a simple linear model has been mostly used for considering the wake effect of a wind turbine on its downstream turbines. In this model, the wind velocity in the wake behind a turbine is obtained as a function of turbine induction factor which was considered to be 0.324 almost in all the previous studies. However, it is obviously evident that this factor is a strong function of turbine blade geometry and operational conditions. In the present study, a new method is introduced by which the induction factor for wind turbines can be calculated based on the method of Blade Element Momentum theory. By this method, the effect of blade profile, wind speed and angular velocity of wind turbine on the induction factor can be easily taken into account. The results show that for different blade profiles and operational conditions, the induction factor differs from the single value used so far. Also it is shown that this difference has a very significant effect in calculated gained power from a wind farm. It is clearly seen that considering the new method for calculating an appropriate induction factor affects the total calculated power generation of a wind farm and consequently influences the farm layout in optimization process. (C) 2014 Elsevier Ltd. All rights reserved.

**General information**
Publication status: Published
Organisations: Department of Wind Energy, Wind Turbines, K.N. Toosi University of Technology
Contributors: Ghadirian, A., Dehghan, M., Torabi, F.
Number of pages: 9
Pages: 31-39
Publication date: 2014
Peer-reviewed: Yes

**Publication information**
Journal: Journal of Wind Engineering & Industrial Aerodynamics
Volume: 129
ISSN (Print): 0167-6105
Ratings:
  - BFI (2014): BFI-level 1
  - Scopus rating (2014): CiteScore 2.13 SJR 0.902 SNIP 2.25
  - Web of Science (2014): Impact factor 1.414
Web of Science (2014): Indexed yes
Original language: English
Keywords: ENGINEERING,, MECHANICS, PARTICLE SWARM OPTIMIZATION, GENETIC ALGORITHM, TURBINES, DESIGN, PLACEMENT, Induction factor, Wind farm layout, Wind farm optimization, Wind turbine characteristics, Blade element momentum, Wind wake model, Electric utilities, Wakes, Wind, Wind power, Wind turbines, Blade-element moments, Induction factors, Wake model, Wind farm, Wind farm layouts, Optimization
DOIs: 10.1016/j.jweia.2014.03.012
Source: FindIt
Source ID: 266916403
Research output: Contribution to journal › Journal article – Annual report year: 2014 › Research › peer-review