

Uncertainty in vertical extrapolation of wind statistics: shear-exponent and WAsP/EWA methods - DTU Orbit (09/11/2017)

Uncertainty in vertical extrapolation of wind statistics: shear-exponent and WAsP/EWA methods

This report provides formulations for estimation of uncertainties involved in vertical extrapolation of winds, as well as the total uncertainty incurred when winds observed at one height are extrapolated to turbine hub height for wind resource assessment. This includes new derivations for uncertainties inherent in determination of (wind) shear exponents, and subsequent vertical extrapolation of wind speeds. The report further outlines application of the theory and results of Kelly & Troen (2014-6) for gauging the uncertainty inherent in use of the European Wind Atlas (EWA) / WAsP method for vertical extrapolation. Lastly, a section has been added that compares the uncertainty in the two aforementioned methods. The independently-derived forms corresponding to each vertical extrapolation method give uncertainty estimates that are essentially the same for small vertical extrapolations ($\frac{v_{pred}}{v_{obs}}$); for larger extrapolations, WAsP-based extrapolation leads to smaller estimated uncertainties than the shear-extrapolation method. A primary motivation for—and part of—this work is the creation of a standard for uncertainty estimation and reporting, which is known as the IEC61400-15. The author is actively contributing to this emerging standard, and the work herein thus far constitutes (most of) the vertical extrapolation portion of the IEC 61400-15 draft.

General information

State: Published

Organisations: Department of Wind Energy, Resource Assessment Modelling

Authors: Kelly, M. C. (Intern)

Number of pages: 13

Publication date: 2016

Publication information

Publisher: DTU Wind Energy

ISBN (Electronic): 978-87-93278-80-6

Original language: English

Series: DTU Wind Energy E

Number: 0121

Main Research Area: Technical/natural sciences

DTU Wind Energy E-0121, DTU Wind Energy E-121

Electronic versions:

VertExtrapUncert_Kelly2016_DTU_en_.pdf

Bibliographical note

Shows the detailed content created by M. Kelly which was used in IEC 61400-15 draft.

Source: PublicationPreSubmission

Source-ID: 123679638

Publication: Research › Report – Annual report year: 2016