July 2016

Invitation
to the IEA Wind Task 31+32 Workshop on

Lidar measurements for wake assessment and comparison with wake models

Date: October 4th 2016
Venue: Technical University of Munich, Munich, Germany
Immediately preceding the Science of Making Torque from Wind conference 2016
Workshop leaders:
Task 31: Javier Sanz Rodrigo, CENER, Spain
Task 32: Davide Trabucchi, ForWind – University of Oldenburg, Germany

Introduction

Within IEA Wind Tasks, experts from the wind energy academy and the industry work together to translate scientific results into practical guidelines to be applied in commercial applications.
In this framework, Task 31 aims to verify, validate, and quantify the uncertainties of the most widely used models on the basis of experimental datasets and Task 32 deals with wind lidar measurements in order to identify and mitigate barriers to the use of lidar technology in wind energy applications. More details about these projects can be found on the Task 31 and Task 32 websites.

Motivation and main objective

Some possibilities to measured complex flows such as wakes with lidars have been explored recently with positive results. These studies suggest that lidar measurement could be included in the verification and validation process of wake models.
The main objective of this workshop is to demonstrate the process by which experimentalists and modelers can apply the verification and validation framework to devise a measurement and modeling campaign to validate a complex flow model.
In particular, the key features of wake simulation models will be investigated in order to find:

1. Which parameters, assumptions or characteristics of the wakes could be verified or validated with lidar measurements, in other words: what should be the objective of lidar measurements that serve this purpose.

2. How a lidar experimental campaign should be designed to provide the measurements necessary for the verification or validation of wake models.

These points will be addressed by wake modelers and lidar experimentalists together in the first part of the workshop. In the second part, lidar experts will compare methodologies commonly used to process the radial wind speed measured by the lidar in a separate session. In particular the horizontal wind speed reconstruction and the grid interpolation will be addressed.
Finally, the need and possibility to prepare a practical exercise to test the application of the methodologies introduced during the workshop will be discussed.

Expected Outcome

Based on the results of the workshop, a report will be compiled to guide the design of a lidar experimental campaign as part of the verification and validation process of wake models. Besides this, preliminary recommendations on how to deal with the corresponding datasets will be included.
All interested participants are invited to contribute to the preparation of the report, which will be coordinated by the workshop leader. Follow-up meetings will be held remotely so that workshop attendees can collaborate on the document, with a target completion date of December 2016.

Practical Arrangements

Registration

For participation in the workshop, please register by sending an email to the Operating Agent Representative David Schlipf (Email). Your registration email should include:

- Name and institution, member country
- Please describe your stakeholder role (e.g., wind turbine manufacturer, lidar supplier, academic, ...)
- A slide to be presented during the introduction round, which describes your experience with lidar wake measurements or wake models and your expectation from the workshop.
- A short description of a datasets with lidar wake measurements which you could present during the workshop (Optional).

Please register before 05 09 2016. Prior to the workshop, registered participants will receive if necessary additional workshop details and exercise materials as well as a pre-workshop survey.
Registration for the workshop is free of charge. Note that it is not necessary to register for the Science of Making Torque from Wind Conference if you will only be attending this 1-day workshop.

Venue Information

The workshop will be held prior the beginning of the Science of Making Torque from Wind Conference 2016 on October 4th, 2016 in Munich at the Technical University of Munich, Campus Garching:

Technische Universität München (TUM), Campus Garching
Boltzmannstraße 15
85748 Garching bei München, Germany

Further information is provided in the venue section on the website of the Science of Making Torque from Wind Conference.

Contact Information

Please contact Davide Trabucchi, or Javier Sanz Rodrigo (workshop leaders) or David Schlipf (IEA Wind Task 32 Operating Agent) with any questions you may have about the workshop.

Expected Participants

Engineers and scientists from the wind energy community with solid background and experience in lidar measurements or wake modelling.

Program

<table>
<tr><th colspan="2">First part (Task 31 + Task 32)</th></tr>
<tr><td colspan="2">08:30 Welcome and introductions
09:00 Verification and Validation process (1x invited presentation)
09:20 Verification of wake models (1x invited presentation)
09:40 Integration of radial velocity measurements with wake models (1x invited presentation)
10:00 Coffee break
10:15 Lidar wake measurements (3x invited presentations)
11:15: Break out discussion:
“How to design lidar experiments to support the verification and validation process of wake models”
12:15 Wrap-up, draft of report outline and formulation of next steps
12:30 Lunch</td></tr>
<tr><th>Second part (Task 31)</th><th>Second part (Task 32)</th></tr>
<tr><td>13:30 Collaboration with Task 30 and Task 32 around Alpha Ventus for integrated modelling of inflow, turbine loading and wake response

15:00 Coffee break

15:15 Definition of benchmarking strategy for the OWA-Rødsand 2 experiment</td><td>13:30 Lidar data processing I (1x invited presentation + round table)
• From the radial speed to the horizontal wind velocity
• Evaluation of the wind direction
• Uncertainty estimation
15:00 Coffee break
15:15 Lidar data processing II (1x invited presentation + round table)
- Grid interpolation
- Wind field propagation
- Wake model fit</td></tr>
<tr><td colspan="2">16:15 Definition of practical exercise about the methodologies discussed
16:40 Workshop wrap-up and formulation of next steps
17:00 End of workshop</td></tr>
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