

IPID4all Doctorate Research Exchange with ECN, Petten (Netherlands)

Feedback report

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1 week

Wind Energy, Wake Research

Introduction

In my PhD project, I analyze data I collected in the wake of a model wind turbine in the wind tunnel of our facility. I examined the data with regard to the inflow turbulence that I changed during my experiments. To validate the results, I need field data as comparison.

For that reason, from June 11th to June 16th, 2017, I stayed at ECN Wind Energy to analyze field data of wind turbine wakes collected at their test site. The ECN accomplishes advanced research in the field of wind energy while cooperating also with industry. Their test site is equipped with several full-scale wind turbines in combination with meteorological (met) masts. It is rare to have data bases with so large amount of collected data and high quality.

Research Undertaken

During my stay, I was provided with an overview of 10 minute averages of field measurements of 1.5 years for three turbines in distances 2.5, 3.5 and 5.5 diameters D from the met mast. The first task was to extract the time slots where the met mast measured the wake of either of the turbines. Afterwards, the time slots were chosen where the turbines operated at a similar operation point as the model wind turbine during the lab measurements. Additionally, data of free flow conditions were needed to describe the turbulence at the test site.

For the chosen time slots, I was afterwards provided with the high-resolution flow measurements from the met mast. I started an analysis of the data that is similar to the analysis I applied to the data collected in the wind tunnel. Until now, the results show evidence for a comparable wake behavior regarding the turbulence. Further analysis is necessary. This will be accomplished in Oldenburg.

Personal Experience

My stay at ECN was very interesting, although the time was relatively short. I focused on the structured extraction and evaluation of the provided data. Being able to talk to the co-workers who oversaw the data base was a great benefit as they provided me with crucial information whenever I had a question regarding the measurements. Also, we had valuable discussions on which data sets best to extract. I could present some of the stochastic analysis methods that are used in our research group, which drew the interest of some co-workers.

The opportunity to visit ECN was a great experience, not only regarding the research for my PhD but also regarding the contacts I made at ECN.

Conclusions

In conclusion, the exchange was beneficial for my research as I will supposedly be able to validate my findings with field measurements. I want to thank the organizers for the opportunities I was provided with due to this stay.

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Outlook

- o Once my results from laboratory measurements are validated with the above-mentioned field measurements, this will be a crucial part of possible publications.

DAAD



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