

IPID4all Doctorate Research Exchange with Murdoch University, Perth (Australia)

Feedback report

Ingrid Neunaber, M. Sc.
Research Group Turbulence, Wind Energy and
Stochastics
Küpkersweg 70, 26129 Oldenburg
Prof. Joachim Peinke
2 weeks
Wind Energy, Wake Research

Murdoch University
School of Engineering and Information Technology
Murdoch, WA 6150, Australia

Jonathan Whale, PhD

Introduction

From February 10th to February 26th, 2017, I stayed at Murdoch University at the School of Engineering and Information Technology where Jonathan Whale is established. Jonathan Whale is involved in industry projects related to wind turbines and investigated wind turbine wakes during his PhD. Thus, his expertise replenishes my research on the stochastic properties in the wind turbine wake. Additionally, Murdoch University maintains renewable energy research facilities where different solar panels are tested over long periods of time and small wind energy converters are stationed in combination with a small met mast.

Research Undertaken

During my stay, I focused on the extraction of relevant information from the data I collected in Oldenburg. Together with Jonathan Whale and Joachim Peinke, who was there as well, we examined the data and summarized the results under different points of view to encourage future publications. A first step was handing in an abstract for the Wind Energy Science Conference 2017 with the title *Experimental study on the intermittency of fluid flow in a wind turbine wake*. The results that will be presented at the conference are also planned to be published in cooperation with Jonathan Whale. As wind tunnel experiments are often criticized regarding a too small Reynolds number and a questionable scalability, Jonathan Whale suggested a comparison with wake data of full-scale turbines for this project. Currently, the wind energy part of the renewable energy research facilities at Murdoch University is under reconstruction and therefore, no wake data is available from Murdoch, but possible sources of data from other research facilities were discussed.

One of Jonathan Whale's PhD students, Anup KC, is currently analyzing atmospheric data in terms of turbulence, and he will apply his results to more accurately simulate loads on wind turbines. An application of stochastic methods is inevitable to capture the important turbulence properties, and we used the time I spent at Murdoch also to discuss the application of stochastic methods that are used in our group to scrutinize turbulence.

Personal Experience

My stay at Murdoch University was very interesting, although the time was relatively short. I focused on the structured evaluation of my data, and I could benefit from Jonathan Whales experience regarding wind turbine wakes in combination with industry applications.

During my stay, I also had the opportunity to visit the different research facilities, which was for me as an experimental physicist very valuable.

Having been provided with the opportunity to visit Australia was a great experience, not only regarding the research for my PhD but also regarding the culture and environment.

IPID4all Doctorate Research Exchange with Murdoch University, Perth (Australia)

Feedback report

Conclusions

In conclusion, the exchange was beneficial for both institutions and future works are planned. I want to thank the organizers for the opportunities I was provided with due to this stay.

Outlook

- o A publication on special features of the wake of a model wind turbine regarding the inflow turbulence is planned
- o Currently, a return visit of Anup KC in a later state of his PhD is discussed

DAAD



Federal Ministry
of Education
and Research