

IPID4all Doctorate Research Exchange with CENER

Feedback report

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Fatigue load estimations for wind turbines*

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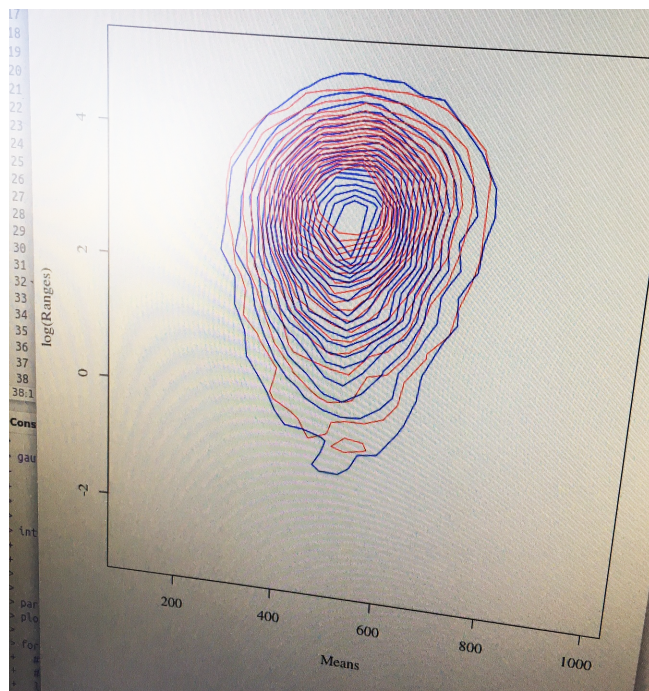
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Introduction

Accurate fatigue estimations of wind turbines and their components are necessary within the design process of such machines. Especially in the presence of highly dynamic wind inflow, as e.g. in turbulence, the common methodologies used for fatigue are pushed to their limits. These engineering tools were in the focus of the exchange project, due to strong background of the host institute in this field.

Research Undertaken

The work conducted during the exchange focuses mainly on the validation of results obtained at the home institute: In the focus of the project are specific dynamics inherent in the wind, whose impact on wind turbine fatigue is unknown. Previously to the exchange, several load calculations were conducted already. The validation of these results was necessary in order to allow for meaningful conclusions. Specifically, the so called *RainFlow* Counting algorithm used previously by the home institute was analysed and overhauled, which impacted the aforementioned results significantly. Additionally, some of the load calculations carried out by the home institute were repeated by the hosting institute in order to validate these. A high agreement between the results of both institutes was found, which gives confidence in the conclusions drawn from this work.



Personal Experience

Besides the knowledge gained with respect to technical issues, several impressions on the personal level were made and shaped the overall experience: First and foremost, it was highly interesting to be in a foreign country for a little longer period and detect differences and similarities in the way of living. Additionally, it was possible to observe how other institutes work. Again there were similarities, but also differences, as for example the experience to work in an open space office, which turned out to be different from the accustomed way of work at the home institute. Due to the differences in the political system, one could get an idea about the differences in the funding system of both institutes, which also results in different priorities, when acquiring new budgets and projects. Another benefit from the exchange was the possibility to discuss the views on joint activities and the status quo of current efforts in European collaborations.

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Conclusions

In conclusion, a new software tool for the assessment of wind turbine fatigue has been compiled. In doing so, a deeper understanding into the underlying subject could be gained, as well. The validation procedures conducted during the exchange are a key achievement and give a new value to the results obtained beforehand, which must also be seen as an important large step towards progress.



Outlook

- o Further collaboration on the topic
- o Planned presentation and publication of the outcome of the exchange at the TORQUE conference in 2018

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