

MSc Thesis: Modelling wind turbine loads in non-uniform inflow conditions

Intro

Last decade has seen a spectacular growth of wind turbine rotors to diameters exceeding 200m. This implies that non-uniformities in the wind distribution over the rotor disk are more pronounced, which challenges the tools used to calculate a wind turbine design envelope.

At the department Wind Energy (WE) of TNO (<https://www.tno.nl/en/focus-areas/energy-transition/expertise/wind-energy/>) we do not only aim to make wind energy a reliable and cost-effective source of renewable energy, we also aim to make it a source of energy which is widely accepted by the public. Do you want to join us to build a more sustainable future?

What are you going to do?

In this project, you will investigate the loading of wind turbines in non-uniform inflow conditions. Thereto you will use a wind turbine code developed by TNO containing both a lifting line free vortex wake and a Blade Element Momentum (BEM) model and have access to purposely performed wind tunnel measurements of a rotor in non-uniform inflow conditions. The results of this investigation should lead to an improved implementation strategy for the engineering simulations using the BEM method, which is the standard aerodynamic tool used in the design of commercial wind turbines.

What do we ask from you?

Your work will be carried out in the TNO Wind Energy department and ForWind University of Oldenburg. Although you are not expected to work full-time from a TNO office, it is appreciated to have physical meetings at the [Petten office](#) once every two weeks. In any case, you will be remotely supervised by two or three Wind Energy experts.

The Wind Energy department houses approximately 60 enthusiastic, academic professionals who have in-depth knowledge of wind energy technology. Your activities are connected to an international project in which TNO and ForWind University of Oldenburg cooperate.

We are looking for MSc students in engineering (e.g. aerospace technology, or sustainable energy technology), with the following characteristics:

- Enthusiasm for research and technology development.
- Interest in wind energy and wind turbine loads.
- Technical knowledge of wind turbines and aerodynamics.
- Independent working attitude.
- Knowledge of Fortran and Matlab or willingness to learn these.
- Good knowledge of the English language.
- Available to work at least 32 hours a week for a period of 6 to 9 months from September 2022 onwards.

If you are the one that we are looking for, please submit your CV and motivation letter in English.

What can you expect from us?

You want to work on the precursor of your career, where a Master Thesis project provides you with the opportunity to take a good look at your prospective future employer. TNO goes a step further because you and your knowledge are essential to our innovation. That's why we attach a great deal of value to your personal and professional development. You will, of course, be properly supervised during your internship, and be given the scope for you to exceed yourself and your expectations. We also provide a monthly compensation of 475,- Euro.

Contact person from ForWind-University of Oldenburg:

Apostolos Langidis (apostolos.langidis@uol.de)