In the research group Wind Energy Systems, ForWind – Center for Wind Energy Research, Institute of Physics of the Carl von Ossietzky University of Oldenburg, there is a vacant PhD position starting as soon as possible for a

Research Assistant (f/m/d)

(Salary according to TV-L E13, 75%)

The research focus will be on

Lidar-based reconstruction of inflow wind fields and wind turbine response

Future large wind turbines require more reliable and cost-efficient design concerning fatigue as well as extreme operating conditions. This requires more realistic models of atmospheric wind fields. Our vision is to establish a high-quality database to develop more precise three-dimensional wind field models and improve the understanding of their impact on the wind turbine response. Therefore, we will scan with a laser beam, the entire wind field in front of a multi-megawatt wind turbine with a high spatial and temporal resolution, and correlate it to the wind turbine behaviour.

The continuous-wave short-range SpinnerLidar is a Doppler wind lidar. It can operate in the rotating hub (spinner) of a wind turbine. It remotely measures line-of-sight wind speed, i.e., the wind component along the inclined beam direction. With a 1 Hz wind field resolution, up to 500 measurement points are scanned on a spherical measurement trajectory. Utilising, e.g., meteorological sensors and fluid dynamics models, the inflow wind fields have to be reconstructed from the raw line-of-sight lidar measurement data. Besides, two ground-based lidar WindScanners with similar measurement capabilities offer further wind field analyses in the open field or the wind tunnel. The wind turbine response can be derived from simultaneous load measurements.

Job Description

The PhD project's main objective is the further development of wind field reconstruction methodologies for short-range Doppler lidars, and the extensive analysis of the interaction between those wind fields and wind turbine dynamics, for a variety of atmospheric conditions.

Among others, the job will comprise:

- conducting lidar measurements campaigns with the SpinnerLidar
- processing large amounts of wind field data by combining lidar measurements with meteorological information, possibly flow models, and wind turbine load data
- wind field reconstruction and modelling for a variety of atmospheric conditions
- identification of turbulence structures with high relevance for the turbine loading
- uncertainty analysis of the reconstructed wind fields and the developed models

The research requires close cooperation with two other research groups of ForWind – Center for Wind Energy Research and further academic and industrial project partners.

Furthermore, the candidate will be given opportunities and firm encouragement to improve personal, scientific, and teaching skills. This could include an international exchange.

Candidate Profile

Prerequisite is a qualifying university degree (diploma or master) in Mechanical Engineering, Physical Sciences, Meteorology, Wind Energy, Remote Sensing, or a similar field. The successful candidate is required to have:

- profound knowledge of at least two of the following three fields: experimental/numerical fluid dynamics, statistical analysis of large data amounts, measurement techniques
- extensive experience in programming with at least MATLAB or Python
- high motivation and ability to work on a complex research topic and to pursue a PhD
- fluency in communicating and reporting in English

The employment is initially limited until January 31st, 2024, with an intention for further prolongation up to four years to facilitate a PhD.

The University of Oldenburg is dedicated to increase the percentage of female employees in the field of science. Therefore, female candidates are strongly encouraged to apply. In accordance with § 21 Section 3 NHG, female candidates with equal qualifications will be preferentially considered. Handicapped applicants will be given preference in case of equal qualification. Full-time positions can be also turned into part-time ones.

Research environment at ForWind – University of Oldenburg

Wind energy research at the Carl von Ossietzky University of Oldenburg has gained international recognition by its integration into ForWind – Center for Wind Energy Research of the Universities of Oldenburg, Hannover and Bremen and into the national Wind Energy Research Alliance of the German Aerospace Center (DLR), Fraunhofer Institute for Wind Energy Systems (IWES) and ForWind. In Oldenburg, researchers from physics, meteorology and engineering are collaborating at the »Research Laboratory for Turbulence and Wind Energy Systems« centred on wind physics. Laboratory experiments, free-field measurements and HPC-based numerical simulations are utilised. Main topics include the description and modelling of wind turbulence, the analysis of interactions of turbulent atmospheric wind flow and wind energy systems as well as control of wind turbines and wind farms. The covered scales are ranging from small scale turbulence up to meteorological phenomena. State-of-the-art facilities comprise three turbulent wind tunnels, different sensing equipment for free-field measurements at on- and offshore wind farms and an own high-performance computing cluster. Two multi-lidar systems, each equipped with three scanning lidars are of particular importance for the research mentioned above.

Contact

Preferably electronic applications should be referenced **#FW66** and must be submitted preferred as **one PDF file** containing all materials in English or German to be given consideration no later than **March 14th, 2021** to

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The PDF file must include:

- A letter motivating the application (cover letter)
- Curriculum vitae
- Grade transcripts and both BSc and MSc certificate
- Qualified certificates of employment/letters of recommendation or at least references
- Research statement of approx. one page: The applicants are requested to write a research statement related to the advertised PhD position. The document should complement the motivation letter and demonstrate the applicant's understanding of relevant research questions related to the position and contain ideas on approaching them and linking them to his/her expertise. Further information is available on request.

A **second PDF file** containing the studies' final thesis or relevant research papers (if available) is an optional attachment.