Universität Stuttgart

INSTITUT FÜR AERODYNAMIK UND GASDYNAMIK
DIREKTOR: PROF. DR.-ING. EWALD KRÄMER
IAG

Bachelorarbeit / Masterarbeit

Data driven 3D correction model for wind turbine blades

The flow physics in the root area of a wind turbine blade is highly complex involving strong dimensionality and unsteady effects. This is mainly driven by the the complex interaction between the separated flow field with the rotation of the blade. As a consequence, the forces acting on the rotor blade deviate significantly from the two-dimensional conditions. This causes inaccuracies on the predicted aerodynamic performance by engineering models, which rely on the aerodynamic polar data. Several empirical methods are available for correcting the data, but they do not always provide good predictions for some cases. To solve for this issue, at IAG a data driven approach will used for developing a new model. The method will make use of an emerging machine learning approach such as deep learning. The following tasks are suggested:

Proposed tasks:

- Collecting available two- and three-dimensional polar data from literature including the possible important features like chord length, local radius, twist, airfoil thickness, Reynolds number, etc.
- Grouping the collected data and identifying the possible combination of the input features. Separating the data into training, cross-validation and test-datasets.
- Implementing the machine learning algorithm. It is recommended to use artificial neural-network (ANN) using the Python code.
- Investigating the effects of several combinations of neurons and layers.
- Applying the new correction model for BEM computations using the B-Go code.

Supervisor: Galih Bangga (bangga@iag.uni-stuttgart.de)
Begin date: The offer remains open until a candidate is found.

Not interested in the above topic but would like to work on other CFD/numerical studies for wind turbine applications? other thesis offers are available per email.