Aerodynamic and aeroelastic characterisation of swept wind turbine blades

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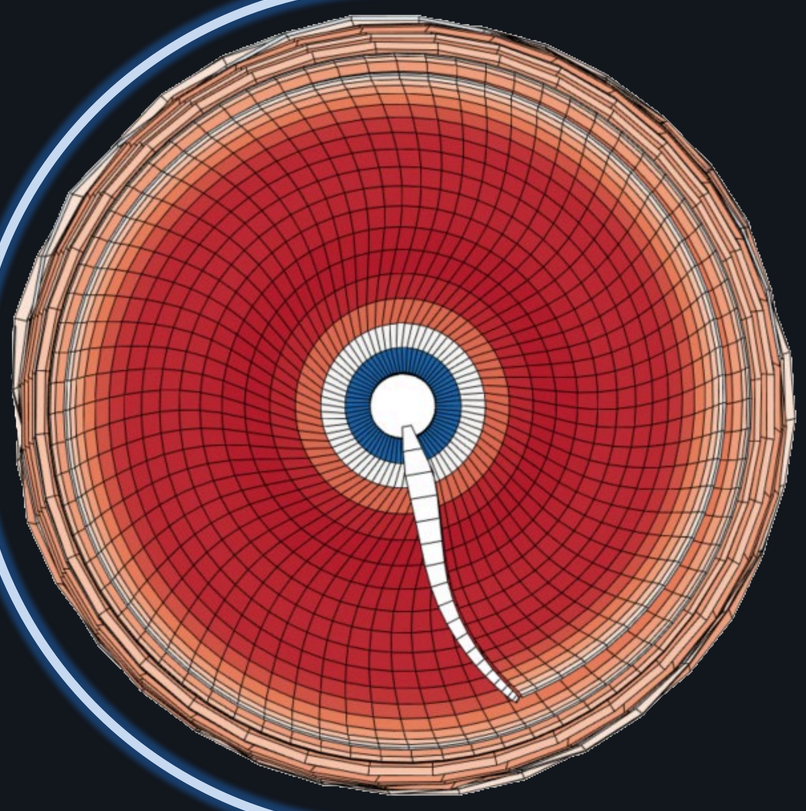

Numerical simulations

- Development of a BEM correction model for swept blades
- Characterisation of blade aerodynamics using simulation tools of varying fidelity (BEM, lifting line, panel codes, RANS)
- Aeroelastic design study of swept blade tips for full-scale wind turbines

Wind tunnel experiment

- Scaled model of IEA 15 MW reference wind turbine
- One campaign with straight blades, one with swept blades
- Flow field visualisation using stereoscopic PIV
- Derivation of blade aerodynamics and loads from PIV data
- Validation of numerical simulation results

Field experiment

- PhD research part of TIADE field experiment (see below)
- Measurements include pressure measurements, LiDAR-based wind fields, strain and deformation data
- Field data used for numerical model validation
- Campaign with swept blade tips planned

Project overview

The research conducted in this PhD is part of the TIADE project, a collaborative research project by TNO, GE Renewable Energy and LM Wind Power. In this project, innovative wind turbine blade improvements (a.o. innovative tips) and blade add-ons (a.o. spoilers, vortex generators) will be developed and validated on a 3.8 MW experimental turbine. For more information scan the QR-code.

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