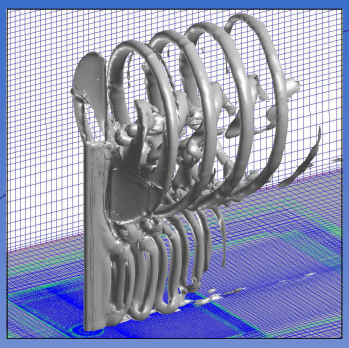
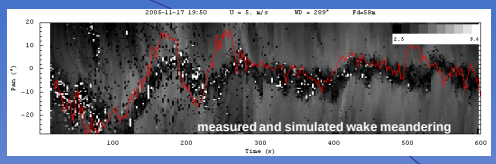
AEROELASTIC DESIGN



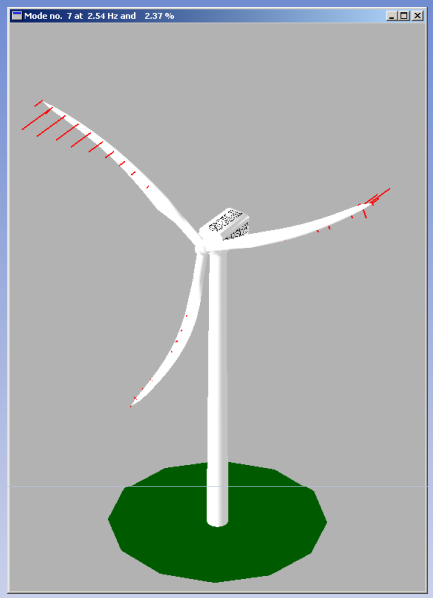
Aeroelasticity

The combination of aerodynamics and structural dynamics into aeroelastic codes allows prediction of the extreme and fatigue loads that a wind turbine experiences during its lifetime.



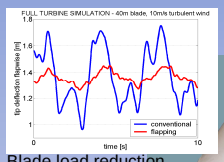
Wakes

Risø has developed a Dynamic Wake Meandering model (DWM) for aeroelastic simulations of loads and power production during wake operation.

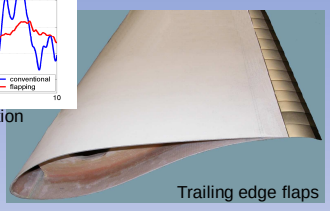


Aerodynamics

Navier-Stokes computations are used as design verification and in the development of simpler and computationally inexpensive engineering models.

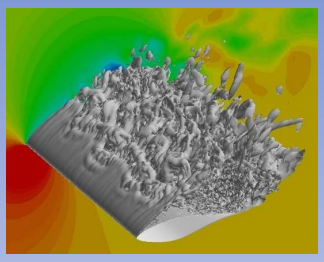


Blade load reduction



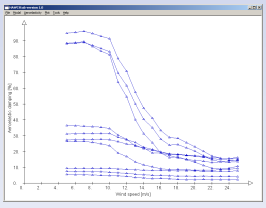
Control

Control of power and loads are important for the complete wind turbine design. E.g. wind turbine blade loads can be reduced considerably using individual pitch or advanced trailing edge flaps.



Rotor Design

Wind turbine airfoils and blades are designed for specific types of power control. In combination with numerical optimization, aerodynamic engineering models and CFD are used to design new wind turbine rotors.

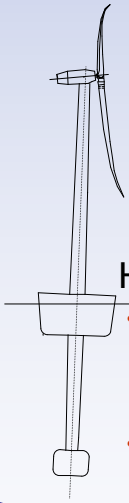


HAWCStab

HAWCStab can be used to analyze the dynamics and stability of wind turbines. The user can compute:

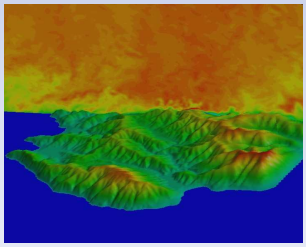
- Natural frequencies
- Damping factors
- Mode shapes

with and without linear aerodynamic forces for various operational conditions and rotor speeds.



HAWC2

- a new aeroelastic code based on a multibody formulation, fully nonlinear regarding large rotations and deflections of all structural components
- unique for modeling of new concepts in general and as illustrated: A (downwind) turbine integrated with a floating structure



Wind conditions

Reliable prediction of wind conditions over complex terrain are determined using hybrid RANS/LES methods.