

Vertical Axis Wind Power

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Fundamental research & Application



The holistic approach

A Wind Energy Converter:

- Turbine -Aerodynamics
- Structure -Aeroelastics
- Structural mechanics, materials
- Generator -Electromagnetics
- Grid connection -Electrical circuits - systems

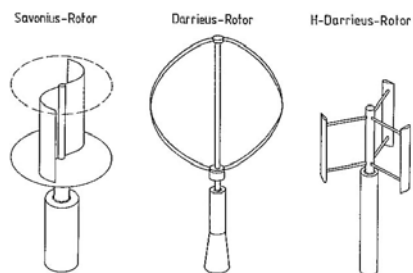
Generator model:

Finite element model of generator including: materials, electromagnetic fields in 2D amended with equations for 3D end winding effects, winding schemes and interaction with external circuit.

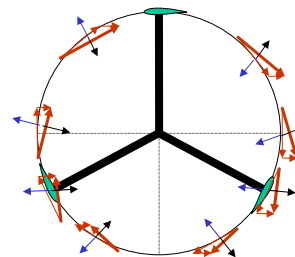
Multiphysics simulation:

- *Magnetic fields
- *Electric fields
- *Thermal, sources and cooling
- *Circuit model

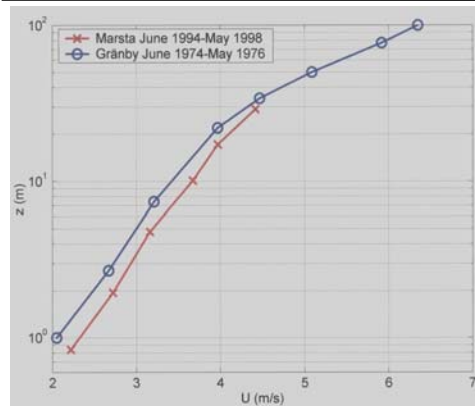
Principle Aerodynamics:



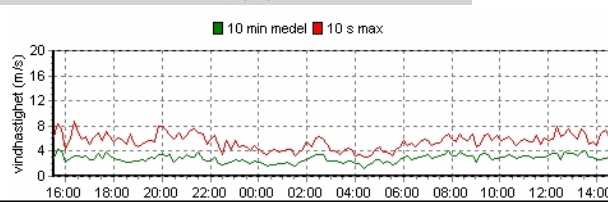
Vind →



Size does matter!



- Wind resource available at higher altitude
- Wind is highly variable



Structural mechanics: resonance

All egenfrequencies has to be calculated in rotating system and related to rotor speed.

Experimental facility Marsta

Small model of large WEC

- Full electric control
- 3 Bladed H-rotor
- Tower height 6 m
- Blade height 5 m
- Turbine diameter 6m
- Rated power 12 kW at 12 m/s



200 kW Falkenberg

Vertical
WIND

Fundament	Armerad betong
Vingmaterial	Glasfiber epoxi
Vinglängd	24 m
Turbindiameter	26 m
Projicerad turbinarea	624 m ²
Navhöjd	40 m
Märkvind	12 m/s
Inkopplingsvind	4 m/s
Urkopplingsvind	25 m/s
Rekommenderad snittvind	6-10 m/s
Överlevnadsvind	60 m/s



Planerad park 800kW Falkenberg 2010



Ericsson Power Tube 2008

Fundament	Betong
Vingmaterial	Glasfiber
Vinglängd	5 m
Turbindiameter	8 m
Projicerad turbinarea	40 m
Navhöjd	30 m
Märkvind	12 m/s
Inkopplingsvind	4,5 m/s
Urkopplingsvind	25 m/s
Rekommenderad snittvind	7-10 m/s
Överlevnadsvind	60 m/s

