Lehrstuhl Steuerung, Regelung und Systemdynamik

Master Thesis

Simulation/Programming

Multi-variable Feed-forward-Feedback Control for Mega-scale Wind Turbines

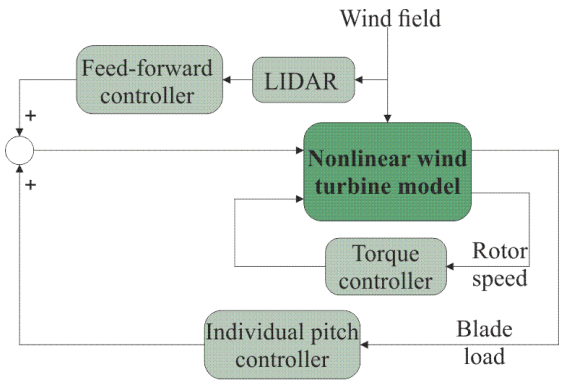
Duration: 6 Months
Requirements: Experience in MATLAB and FORTRAN programming languages
Language: English
Target groups: Master students (Maschinenbau, or ISE)

Content:

Wind energy is CO_2 emission free source of energy and its advantages over the fossil fuel counterpart cannot be over emphasized. Because of the growing demand on wind energy, the current trend is to manufacture larger wind turbines with higher rating. This translates to larger rotor diameter and rotor sweep area. As the rotor size increases, the unbalanced rotor loads due to variable wind speed, wind shear and tower shadow among other factors becomes more pronounced.

One of the main challenges of controlling such large turbines is to know beforehand the dynamics of incoming wind before it interact with rotor blades. Such knowledge about incoming wind would assist in control design since the dynamics actuation mechanisms are slower compared to that of wind. The goal of this work is to design and analyze a multi-objective control scheme for large wind turbine to balance between conflicting objectives of regulating power/rotor speed and eliminating cyclic structural loads using light detection and ranging (LIDAR) technique


http://usuaris.tinet.cat/zefir/pitch.h



The steps related to this work can be summarized as:

1) Intensive literature research on wind turbine control strategies
2) Multi-objective control design approach in wind turbine
3) Verification of results with other existing control approaches
4) Detailed documentation and presentation of the research findings

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