Abstract

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A Fault Detection System for The Yaw Control of A HAWT Based on Neural Networking

The objective of the yaw control system in a horizontal axis wind turbine (HAWT) is to follow the wind direction with a minimum error. In this paper, a data driven fault detection approach of a HAWT is applied. Three simulation programs were utilized in order to model a 1.5 MW HAWT. These programs are Fatigue, Aerodynamics, Structures, and Turbulence (FAST), TurbSim, and MATLAB. The approach is implemented under normal operating scenarios while considering different wind velocities. Different kinds of faults were applied to the system for a nacelle-yaw angle error ranging from -10° to +20°. The simulation results of the Tower Top Deflection (TTD) in the time domain were transferred into frequency domain by Fast Fourier Transform (FFT). The output variables were used in order to build a Neural Networking, which will monitor the performance of the wind turbine. The built Neural Networking will also provide an early fault detection to avoid the operating conditions that lead to sudden turbine breakdown. The present work provides initial results that are useful for remote condition monitoring and assessment of a 1.5MW HAWT. The simulation results indicate that the implemented Neural Networking can achieve improvement of the wind turbine operation and maintenance level.