Feature Extraction Using Discrete Wavelet Transform for Gear Fault Diagnosis of Wind Turbine Gearbox - DTU Orbit (19/02/2019)

Feature Extraction Using Discrete Wavelet Transform for Gear Fault Diagnosis of Wind Turbine Gearbox

Vibration diagnosis is one of the most common techniques in condition evaluation of wind turbine equipped with gearbox. On the other side, gearbox is one of the key components of wind turbine drivetrain. Due to the stochastic operation of wind turbines, the gearbox shaft rotating speed changes with high percentage, which limits the application of traditional vibration signal processing techniques, such as fast Fourier transform. This paper investigates a new approach for wind turbine high speed shaft gear fault diagnosis using discrete wavelet transform and time synchronous averaging. First, the vibration signals are decomposed into a series of subbands signals with the use of multiresolution analytical property of the discrete wavelet transform. Then, 22 condition indicators are extracted from the TSA signal, residual signal, and difference signal. Through the case study analysis, a new approach reveals the most relevant condition indicators based on vibrations that can be used for high speed shaft gear spalling fault diagnosis and their tracking abilities for fault degradation progression. It is also shown that the proposed approach enhances the gearbox fault diagnosis ability in wind turbines. The approach presented in this paper was programmed in Matlab environment using data acquired on a 2MW wind turbine.

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