

Vibration-based bearing fault diagnosis by an integrated DWT-FFT approach and an adaptive neuro-fuzzy inference system

I. Atoui, N. BOUTASSETA, N. Fergani, B. Oudjani, A. Deliou

Abstract : The rotating machine, which can be subject to breakdowns or dysfunctions in its time-of-use, represents an essential part in the majority of industrial applications. Hence, their reliability, productivity, safety and availability are very important issues that are imposed to increase production with quality assurance as per given specification at a reasonable cost. Furthermore, because the bearing faults are the most frequent and critical defects in rotating machinery that may have a direct influence on the availability of the machine itself and also on those of the surrounding systems, a particular interest is carried in this paper to the analysis and diagnosis of these defects which can appear in the bearing's ball, inner race and outer race with various fault severity and rotating speed. This paper consists of the application of the Discrete Wavelet Transform DWT and Fast Fourier Transform FFT theories to extract the amplitude of the fundamental bearing defect frequencies in the vibration signal from a rotating machine. These parameters will be used by the Adaptive Neural Fuzzy Inference System ANFIS to automate the fault detection and diagnosis process. Experimental results show that the proposed procedure can classify with precision various types of bearing faults according to the fault location and severity.

Keywords : bearing faults, vibration signal, Fault Diagnosis, ANFIS, DWT, FFT