Investigation of Blade Diagnosis by Empirical Mode Decomposition

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Abstract : The bladed disk components are considered as the most common cause of failures in turbomachines. The failure of a single blade can potentially compromise the total integrity of the machine. The aim of this article is to detect the blade failures such as crack, deformations, fracture of blade and blade loss using vibration analysis. Many signal analysis methods are able to extract useful information from vibration data. Currently, the most of these methods use temporal analysis based on scalar indicators. However, these methods present some limitations. In the present work, we are interested to the vibration signal analysis by the Empirical Mode Decomposition (EMD) and Fast Fourier Transform (FFT). The EMD is one of the most important topics in digital signal processing, by using this method the measured signals are decomposed into Intrinsic Mode Functions (IMFs) and then the spectrum of some IMFs are generated. By using the real vibration measurements from a pilot scale, the obtained results show that Blade defects are detected successfully.

Keywords : Turbomachinery, Blade faults, Scalar Indicators, EMD, FFT