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ROLLER BEARING FAULT DETECTION USING VIBRATION DATA ANALYSIS AND NON-LINEAR DYNAMIC MODEL APPROACHES

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ABSTRACT

Roller bearings are the most important parts in the rotating machinery applications, which have a great influence on dynamic responses that act as the main source of vibration and noise. Hence, it is vital to identify the faults in these elements for a safe and effective operation. This research paper seeks to detect and diagnose roller bearing early faults using vibration data analysis techniques. To achieve this investigation, time domain, frequency domain and the envelope spectrum techniques were used to analyze the experimental collected data of healthy, inner race and outer race faults. The results revealed that, the envelope spectrum technique proved to be the most reliable method to detect such faults. Furthermore, one degree of freedom non-linear dynamic model was also developed using Matlab Toolbox to study the bearing vibration response of healthy and faulty bearing. The results of the model stated that, there is a clear correlation with the achieved experimental results. Therefore, the developed model can be implemented to investigate the faults of any geometric structure bearing.

Keywords: Rotating machinery; Roller bearing; Vibration data analysis; Envelope spectrum