

Application of Envelope Spectrum Analysis and Spectral Kurtosis to Diagnose Debris Fault in Bearing Using Acoustic Signals

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Abstract : Debris fault diagnosis based on acoustic signals in rolling element bearing running at low speed and high radial loads are more of low amplitudes, particularly in the case of debris faults whose signals necessitate high sensitivity analyses. As the rollers in the bearing roll over debris trapped in grease used to lubricate the bearings, the envelope signal created by amplitude demodulation carries additional diagnostic information that is not available through ordinary spectrum analysis of the raw signal. The kurtosis value obtained for three different scenarios (debris induced, outer crack induced, and a normal good bearing) couldn't be used to easily identify whether the used bearings were defective or not. It was established in this work that the envelope spectrum analysis detected the fault signature and its harmonics induced in the debris bearings when bandpass filtering of the raw signal with the frequency band specified by kurtogram and spectral kurtosis was made.

Keywords : rolling bearings, rolling element bearing noise, bandpass filtering, harmonics, envelope spectrum analysis, spectral kurtosis

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