

Application of Local Mean Decomposition for Rolling Bearing Fault Diagnosis Based On Vibration Signals

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Abstract : Vibration analysis has been frequently applied in the condition monitoring and fault diagnosis of rolling element bearings. Unfortunately, the vibration signals collected from a faulty bearing are generally non stationary, nonlinear and with strong noise interference, so it is essential to obtain the fault features correctly. In this paper, a novel numerical analysis method based on local mean decomposition (LMD) is proposed. LMD decompose the signal into a series of product functions (PFs), each of which is the product of an envelope signal and a purely frequency modulated FM signal. The envelope of a PF is the instantaneous amplitude (IA) and the derivative of the unwrapped phase of a purely flat frequency demodulated (FM) signal is the IF. After that the fault characteristic frequency of the roller bearing can be extracted by performing spectrum analysis to the instantaneous amplitude of PF component containing dominant fault information. The results show the effectiveness of the proposed technique in fault detection and diagnosis of rolling element bearing.

Keywords : fault diagnosis, condition monitoring, local mean decomposition, rolling element bearing, vibration analysis

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