

The Lubrication Regimes Recognition of a Pressure-Fed Journal Bearing by Time and Frequency Domain Analysis of Acoustic Emission Signals

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Abstract : The health of the journal bearings is very important in preventing unforeseen breakdowns in rotary machines, and poor lubrication is one of the most important factors for producing the bearing failures. Hydrodynamic lubrication (HL), mixed lubrication (ML), and boundary lubrication (BL) are three regimes of a journal bearing lubrication. This paper uses acoustic emission (AE) measurement technique to correlate features of the AE signals to the three lubrication regimes. The transitions from HL to ML based on operating factors such as rotating speed, load, inlet oil pressure by time domain and time-frequency domain signal analysis techniques are detected, and then metal-to-metal contacts between sliding surfaces of the journal and bearing are identified. It is found that there is a significant difference between theoretical and experimental operating values that are obtained for defining the lubrication regions.

Keywords : acoustic emission technique, pressure fed journal bearing, time and frequency signal analysis, metal-to-metal contact

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