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Vibration signal analysis to classify spur gearbox failure.

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A gearbox is a fundamental component in a rotating machine; therefore, detecting a fault or malfunction is indispensable early to avoid accidents, plan maintenance activities and reduce downtime costs. The vibration signal is widely used to monitor the condition of a gearbox because it reflects the dynamic behavior in a non-invasive way. The objective of this research was to perform a ranking of condition indicators to classify the severity level of a series mechanical faults efficiently.
The vibration signal was acquired with six accelerometers located in different positions by modifying the load and frequency of rotation using a spur gearbox with different types and severity levels of failures simulated in laboratory conditions. Firstly, to summarize the vibration signal condition, indicators (statistical parameters), both in time and frequency domain were calculated. Then, Random Forest (RF) selected the leading condition indicators, and finally, the k nearest neighbors and RF ranking methods were used and compared for the severity level.
In conclusion, the leading condition indicators were determined for the time and frequency domain to classify the severity level, being the most efficient classification method Random Forest.

Keywords

Condition indicators, Random Forest, KNN classifier, Vibration, Gearbox.

Special/invited session

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