

Documents

Moazenahmadi, A., Petersen, D., Howard, C., Sawalhi, N.

Defect size estimation and analysis of the path of rolling elements in defective bearings with respect to the operational speed

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Abstract

This paper investigates and explains the path of a rolling element in the defect zone and the nature of the entry and exit events of the two main features that appear in the vibration signal of a defective bearing. Vibration response and contact forces between the rolling elements and bearing raceways are simulated and compared with the measured vibration signals. Assumptions used in previous defect size estimation methods in describing the path of the rolling elements in the defect zone, are investigated and some discrepancies are identified. These analyses are essential to develop defect size estimation algorithms. Therefore, the defect size estimation results of the existing signal processing algorithms often contain significant errors and are biased for different operational speeds. A method to validate the explanations offered by this study for the true path of rolling elements in the defect zone is proposed. This method can be used for defect size estimations for defective bearings. The research shows that this method is more accurate and less biased for speed when compared with existing methods.

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