International Journal of Automobile Engineering
Research and Development (IJAuERD)
ISSN(P): 2277-4785; ISSN(E): 2278-9413
Vol. 5, Issue 4, Dec 2015, 23-40

AN ANALYSIS ON DIAGNOSIS OF FAULT DETECTION IN GEAR TRANSMISSION SYSTEMS

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ABSTRACT

The diagnosis of fault detection in gear transmission systems have attracted considerable attention in recent years, however the need to decrease the downtime on production machinery and to reduce the extent of the secondary damage caused by failures. However, little research has been done to develop gear shaft and planetary gear crack detection methods based on vibration signal analysis. In this article, an approach to gear shaft and planetary gear fault detection based on the application of the wavelet transform to both the time synchronously averaged (TSA) signal and residual signal is presented. Wavelet approaches themselves are sometimes inefficient for picking up the fault signal characteristic under the presence of strong noise. In this thesis, the auto covariance of maximal energy wavelet coefficients is first proposed to evaluate the gear shaft and planetary gear fault advancement quantitatively. For a comparison, the advantages and disadvantages of some approaches such as using variance, kurtosis, the application of the Kolmogorov-Smirnov test (K-S test), root mean square (RMS) , and crest factor as fault indicators with continuous wavelet transform (CWT) and discrete wavelet transform (DWT) for residual signal, are discussed. It is demonstrated using real vibration data that the early faults in gear shafts and planetary gear can be detected and identified successfully using wavelet transforms combined with the approaches mentioned.

KEYWORDS: Gear Transmission Systems, Time Synchronously Averaged (TSA) Signal, Kolmogorov-Smirnov Test (K-S Test)

Received: Nov 23, 2015; **Accepted:** Dec 14, 2015; **Published:** Dec 16, 2015; **Paper Id.:** IJAuERDDEC20153

Original Article