

## Vehicle Gearbox Fault Diagnosis Based on Cepstrum Analysis

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**Abstract :** Research on damage of gears and gear pairs using vibration signals remains very attractive, because vibration signals from a gear pair are complex in nature and not easy to interpret. Predicting gear pair defects by analyzing changes in vibration signal of gears pairs in operation is a very reliable method. Therefore, a suitable vibration signal processing technique is necessary to extract defect information generally obscured by the noise from dynamic factors of other gear pairs. This article presents the value of cepstrum analysis in vehicle gearbox fault diagnosis. Cepstrum represents the overall power content of a whole family of harmonics and sidebands when more than one family of sidebands is present at the same time. The concept for the measurement and analysis involved in using the technique are briefly outlined. Cepstrum analysis is used for detection of an artificial pitting defect in a vehicle gearbox loaded with different speeds and torques. The test stand is equipped with three dynamometers; the input dynamometer serves as the internal combustion engine, the output dynamometers introduce the load on the flanges of the output joint shafts. The pitting defect is manufactured on the tooth side of a gear of the fifth speed on the secondary shaft. Also, a method for fault diagnosis of gear faults is presented based on order cepstrum. The procedure is illustrated with the experimental vibration data of the vehicle gearbox. The results show the effectiveness of cepstrum analysis in detection and diagnosis of the gear condition.

**Keywords :** cepstrum analysis, fault diagnosis, gearbox, vibration signals

**Conference Title :** ICCV 2014 : International Conference on Connected Vehicles

**Conference Location :** Paris, France

**Conference Dates :** September 22-23, 2014