

4. Conclusion

Based on describing the basic components on JZQ-250 structural parameters, calculating the characteristic frequency of gear transmission system, analyzing the measuring points arrangement, setting working state and studying data collection methods; analyzing JZQ-250 gear transmission system under normal state, gear fault status and bearing fault condition based on the LMD cyclostationarity demodulation method. Aiming at the shortcomings of the second-order cyclostationarity statistics, it is easy to produce the cross-interference term when it demodulates the multi-component modulation signal. LMD decomposition method is used to decompose the signal into a single component, smooth demodulation, extraction characteristics. By the use of second order cyclic statistics and spectral correlation method can effectively extract the corresponding fault characteristics, and effectively suppress the influence of cross-interference terms in actual use, and they have the positive significance to diagnostic result.

Acknowledgement

This work is sponsored by the Natural Science foundation of Shanxi, project No. 2010011031-1, and Shanxi Province Science Foundation for Youths, project No. 2015021123. The author would like to thank the great support from all members of the research team.

References

- Chen Zhongsheng, Yang Yongmin, Hu Zheng, Shen Guoji, Early detection of bearing faults in helicopter gearbox based on cyclic-statistics, *Acta Aeronautica Et Astronautica Sinica*, vol.26, no.3, pp371-375, 2005.
- Chen Ming. *Study on the application of cyclostationarity theory in gear and rolling element bearing fault diagnosis*. Taiyuan University of Technology, 2008.
- Yang Jianwen, Jia Mingping, Xu Feiyun, Application of EMD to Cyclostationarity fault signal [J]. *Journal of South East University (Natural Science Edition)*, vol.36, no.01, pp 77-80, 2006.
- Li Qiang, Wang Taiyong, Xu Yonggang, Leng Yonggang. The application of the EMD-cyclicdomain demodulation in mechanical fault diagnosis [J]. *Journal of Vibration And Shock*. vol.25, no.4, pp34-37, 2006.
- Hu Yuchen, *Fault Diagnosis Technology of Gearbox based on LMD and Cyclostationarity Demodulation*, North University of China, 2014.
- Ming Yang, *Study on Cyclostationarity and Blind Source Separation-Based Rolling Element Bearing Fault Feature Extraction*, Shanghai Jiaotong University, 2013.
- Du Xiaoshan, Dong Hongbo, Liang Chunmiao, Li Bin, Study on the second-order cyclic spectrum slices and its application in mechanism fault diagnosis, *Journal of Shanxi University of Science & Technology*, vol.28, no.1, pp79-83,2010.
- Bi Guo, *Study on Weak Fault Characteristics Extraction of Rolling Element Bearing and Gear Based on Cyclostationarity*, Shanghai Jiao Tong University, 2007
- Jonathan S.Smith. The local mean decomposition and its application to EEG perception data. *Journal of The Royal Society Interface*, vol. 2, no.5, pp443-454, 2005.

Biography

Zhuting Yao is professor, College of Mechanical and Power Engineering, North University of China, and the leader of Equipment testing diagnosis and control.

Dr. Yao has been awarded as the Outstanding Scientist in Taiyuan area, expert member of graduate education in Shanxi Province and in the Ministry of Education, committee member of High Education, senior expert of Department of Education, Shanxi Province, National Mechanical Engineering Testing Technology Research Association North China Branch Deputy Secretary-General, equipment engineering professional committee of Shanxi Province Mechanical Engineering Society, and committee member of the Seventh, Eighth and Ninth Committee of China Computer Users Association.

Her research areas mainly focus on control technology, diagnosis of machinery-electronic system, and reliability etc. Since 2002, Dr Yao had directed 30 research programs, participated 25 programs, awarded 1 item for Ministry of Education nominated national scientific and technological progress secondary Award, and 5 items for Shanxi Province Science and Technology Improvement secondary Awards.