Fault Feature Extraction And Diagnosis Of Gear Transmission System Using EMD And Machine Learning Approach

D. Mallikarjuna Reddy
Department of Design and Automation, School of Mechanical Engineering.
VIT University
Vellore, Tamilnadu, India.
dmreddyiitm@gmail.com

Abstract

There are growing demands for Machinery health monitoring and fault diagnosis of rotating machinery to lower unscheduled breakdown. Gearboxes are one of the fundamental components of rotating machinery; their faults identification and classification always draw a lot of attention. However, non-stationary vibration signals and low energy of weak faults makes this task challenging in many cases. Thus, a new fault diagnosis method which combines the Empirical mode decomposition (EMD), time frequency method, and self-organizing feature extraction machine learning approach is proposed in this paper. In particular, efficient feature extraction and feature selection is a key issue to automatic condition monitoring and fault diagnosis processes. To focus on such issues, this paper presents a research study to formulate an real-time prediction method using vibration signals of various gears conditions that uses empirical mode decomposition (EMD) technique to extract features and select the predominant features by using various classification algorithms.

Keywords
Empirical mode decomposition, intrinsic mode functions, fault diagnosis, spectral features, classification algorithms.

Biographies

D. Mallikarjuna Reddy was born in Kurnool, Andhra Pradesh, India, on June 17, 1979. He has graduated with a Bachelor of Engineering in Mechanical Engineering in 2000 from the University of Gulbarga, Master of Technology in Maintenance Engineering in 2003 from Visvesvaraya Technological University and PhD from Indian Institute of Technology Madras (IITM) in Machine design specialization. He is having 5 years of Industrial experience and 6 years of academic experience. He is currently working as associate professor at VIT University Vellore, India. He has published two patents on wind turbines condition monitoring and 35 publications in reputed journals and conference proceedings. His research areas of interest are condition monitoring of machinery and structures, Impact analysis, Fatigue and acoustic analysis. He was undertaken several funding projects by Govt. of India in the field of impact analysis on composites and condition monitoring.