

Bearing fault diagnosis based on feature extraction and condition classification

Tawfik THELAIDJIA, Salah CHENIKHER

Abstract: Bearing fault diagnosis has attracted significant attention over the past few decades. It consists of two major parts: vibration signal feature extraction and condition classification for the extracted features. In this paper, feature extraction from faulty bearing vibration signals is performed by a combination of signal's time-varying statistical parameters and features obtained through the preprocessing of the vibration signal samples using Db2 discrete wavelet transform at the fifth level of decomposition. In this way, an 8-dimensional vector of the vibration signal feature is obtained. After feature extraction from vibration signal, the support vector machine (SVM) was applied to automate the fault diagnosis procedure. To improve the classification accuracy for bearing fault prediction, particle swarm optimization (PSO) is employed to simultaneously optimize the SVM kernel function parameter and the penalty parameter. The results have shown feasibility and effectiveness of the proposed approach.

Keywords : Condition monitoring, Discrete wavelet transform, Roller Bearing, Particle Swarm Optimization, Statistical parameters, Support vector machine