## عنوان مقاله:

Gearbox Fault Detection through PSO Exact Wavelet Analysis and SVM Classifier

## محل انتشار:

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## خلاصه مقاله:

Time-frequency methods for vibration-based gearbox faults detection have been considered the most efficient method. Among these methods, continuous wavelet transform (CWT) as one of the best time-frequency method has been used for both stationary and transitory signals. Some deficiencies of CWT are problem of overlapping and distortion of signals. In this condition, a large amount of redundant information exists so that itmay cause false alarm or misinterpretation of the operator. In this paper a modified method called Exact Wavelet Analysis is used to minimize the effects of overlapping and distortion in case of gearbox faults. To implement exact wavelet analysis, Particle Swarm Optimization (PSO) algorithm has been used for this purpose. This method have been implemented for the acceleration signals from 2D acceleration sensor acquired by Advantech™ PCI-1710 card from a gearbox test setup in Amirkabir University of Technology. Gearbox has been considered in both healthy and chipped tooth gears conditions. Kernelized Support Vector Machine (SVM) with radial basis functions has used the extracted features from exactwavelet analysis for classification. The efficiency of this classifier is then evaluated with the other signals acquired from the setup test. The results show that in comparison of CWT, PSO Exact Wavelet Transform has better ability in feature extraction in price of more computational effort. In addition, PSO exact wavelet has better speed comparing to Genetic Algorithm (GA) exact wavelet in condition of equal population because of factoring mutation and crossover in PSO algorithm. SVM classifier with the extracted features in gearbox shows very good results and its .ability has been proved

## کلمات کلیدی:

Gearbox, Fault, Wavelet Transform,Support Vector Machine, Particle Swarm Optimization