Incipient Gear Fault Detection Using Adaptive Impulsive Wavelet Filter Based on Spectral Negentropy

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Abstract

Adaptive wavelet filtering is a very important fault feature extraction method in the domain of condition monitoring, however, due to the time-consuming computation and difficulty of choosing criteria used to represent incipient faults, the engineering applications are limited to some extent. In order to detect the incipient gear faults with a fast speed, a new criterion is proposed to optimize the parameters of modified impulsive wavelet for constructing an optimal wavelet filter to detect impulsive gear faults. Firstly, a new criterion based on the spectral negentropy is proposed. Then, a novel searching strategy is applied to optimize the parameters of the impulsive wavelet based on the new criterion. Finally, envelope spectral analysis is applied to find the incipient fault characteristic frequency. Both the simulation and experimental validation have shown the superiority of the proposed approach

Full Text

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