

# **Gear Fault Diagnosis Based on Narrowband Demodulation with Frequency Shift and Spectrum Edit**

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## **Abstract**

To address the difficulties on the vibration feature extraction of gear localized faults for rotating machinery under varying speed conditions, an improved narrowband demodulation method with spectrum edit and frequency shift is proposed in the paper. The vibration signal is acquired and resampled at constant angle increments at first, by which the non-stationary signal is converted into a quasi-stationary signal in the angular domain to reduce the distortions caused by the speed fluctuations. Subsequently, the signal in the angular domain is processed by a synchronous average algorithm, where the noises can be eliminated effectively and the order components corresponding to the gear faults become prominent. Finally, the narrowband demodulation scheme with the spectrum edit and frequency shift is applied on the averaged signal. By using the spectrum edit, most of unconcerned components can be filtered out effectively. Moreover, the frequency shift property of the Fourier transform is employed in the proposed demodulation scheme to obtain a better phase demodulation result. Simulations and experiments support the proposed scheme positively.

**Keywords:** narrowband demodulation, gear faults, spectrum edit, frequency shift, synchronous average

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