

## 基于特征向量盲分离的多频微弱信号检测方法

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摘要:

研究了低信噪比条件下混合信号的盲分离, 针对实际探测的微弱信号常常是多个频率微弱信号共存的情形, 进行了利用特征向量盲分离检测多个频率周期性微弱信号的研究, 以便把利用特征向量盲分离的微弱信号检测应用于信号处理中微弱信号的提取。该方法首先建立混合信号阵元接收模型, 利用多路传感器信号盲分离提取有用信号, 达到微弱信号检测的目的。仿真和实测数据试验结果表明, 此方法可检测出湮没在强噪声环境中的微弱信号的幅度和频率, 在-30dB极低信噪比下恢复出了多个弱信号, 具有很高的可靠性。

关键词: 特征向量盲分离; 多频微弱信号检测; 信噪比; 信号模型

## A Method for Detection of Multi-Frequency Weak Signal Based on Vector Blind Source Separation

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**Abstract:**

Blind Source Separation of mixtures in the very low SNR circumstance is studied by the paper; Aiming at the Actual case that there are several signals with different frequency in the signal from the sensor, the study of detection of multi-frequency weak signal by the Vector Blind Source Separation is performed, so as to extract the weak signal in the signal processing through application of weak signal detection based on Vector Blind Source Separation. The model of signal annihilated in the noise is firstly built, and then mixtures from multi-sensors are separated to realize the useful signals. The simulations show that the amplitude, frequency of weak signals blurred by high noise can be estimated, more than one signal simultaneously at very low SNR of -30dB are recovered by the new method, which is of high reliability.

**Keywords:** Vector Blind Source Separation; multi-frequency weak signal detection; signal to noise ratio; signal model

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