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基于方向性S变换的多分量FM信号瞬时频率估计

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摘要：

针对复杂多分量调频信号的瞬时频率估计问题，提出一种基于方向性S变换的瞬时频率估计方法。首先，在S变换中引入变趋势窗，有效改善了高频区的频率分辨率；其次，提出了方向性S变换，该变换在引入方向性参数的基础上，利用最大化准则实现了复杂调频信号的时频方向匹配；最后，由于传统时频脊线及相应的均方根误差准则无法适用于多分量信号瞬时频率估计的性能评估，提出一种基于支撑域的置信度准则。仿真实验通过线性与非线性的多分量混合调频信号证明了该方法的有效性。

关键词： 瞬时频率估计 方向性S变换 多分量调频信号 变趋势窗

Instantaneous frequency estimation of multicomponent FM signals based on directional S transform

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Abstract:

A directional S transform is proposed to estimate the instantaneous frequency of multicomponent frequency modulated signals. High performance is achieved by three stages. Firstly, to resolve the low frequency resolution on the time frequency plane at high frequency, a varying tendency window is introduced into the S transform. Secondly, in order to achieve the directional matching of the complex frequency modulated(FM) signals on the time frequency(TF) plane, the directional S transform is presented by incorporating directional parameter and maximal rule. Finally, since the TF ridge and the corresponding mean square errors will be invalid under multicomponents conditions, a confidence criterion of auto term region is also proposed. The effectiveness of the presented method is verified by the mixture of linear and nonlinear FM signals.

Keywords: instantaneous frequency(IF) estimation directional S transform multicomponent frequency modulated(FM) signal varying tendency window

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