算法研究

非均匀傅里叶变换频率不变波束形成方法

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摘要：

频率不变波束形成是宽带阵列信号处理研究的重要内容之一。本文以麦克风阵列语音处理为研究对象，针对FIB低频处波束形成一致性不理想的问题，提出了一种基于非均匀傅里叶变换的频率不变波束形成方法。该方法采用非均匀采样来增加低频处的采样点数，构建符合非均匀傅里叶逆变换的范德蒙矩阵，再用优化对称窗函数对变换结果进行截取，得到空时滤波器。该方法不仅实现了低频段与期望波束响应近似的波束图，且降低了阵元数目。计算机仿真实验结果验证了该方法的有效性。

关键词： 频率不变波束形成；麦克风阵列；非均匀傅里叶变换；波束响应；空时滤波

A Non-uniform Fourier Transformation Method for Frequency Invariant Beamforming

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Abstract:

Frequency invariant beamforming is an important research direction of broadband array signal processing. Considering the application of speech processing based on microphone array, a novel frequency invariant beamforming method based on non-uniform Fourier transformation is proposed to solve the frequency invariant property even for the lower frequencies of FIB in this paper. This proposed method represents Vandermode matrix for non-uniform Fourier inverse transformation, in which the data of low frequency sampling is increased. Then an optimal symmetric window function is presented to process it. The spatial - temporal filter was constructed in the end. Thus not only the approximating expected beam response is obtained even for the low frequency band, but also the number of sensors are reduced. The computer simulation results show that the proposed method is effect

Keywords: Frequency invariant beamforming　Microphone array　Non-uniform Fourier transformation Beam response　Spatial-temporal filtering

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