传感技术学报
中国微米纳米技术学会
全国高校传感技术研究会 主办

基于麦克风阵列声音信号定位方法的研究

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基金项目：基于微声传感阵列的油气管道内检测器跟踪标记系统研究

摘　要：

本文提出了一种在嘈杂环境下利用麦克风阵列对声音信号定位的方法。该方法对每个麦克风采集的声音信号进行经验模态分解，然后根据各个IMF信号的归一化能量挑选出主要的IMF分量进行信号重构，从而实现对信号进行降噪处理。将降噪后的信号使用互功率谱相位法进行相关运算，计算出不同麦克风声音信号出现的时间差异。根据信号时延和麦克风之间的几何位置关系计算出声音信号的位置。为了验证本文所提出的定位算法，进行了语音信号定位实验，通过实验实测的数据分析对比分析，验证了本文提出的方法比传统的定位算法要优越。

关键词：声源定位; EMD分解; 室内环境, 信号到达时间, 互功率谱相位;

Sound source localization based on microphone arrays

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Abstract:

In this paper, an algorithm of sound source localization in the presence of noise using microphone arrays is proposed. Firstly, each of the sensor outputs is separated into several intrinsic mode functions (IMFs) using empirical mode decomposition (EMD). Secondly, normalized energy of each IMFs is calculated and IMFs were denoised according to normalized energy. The remaining signals are restructured only using main IMFs in order to increase the input signal-to-noise ratio. Lastly, time delay among different microphones is estimated by generalized cross correlation-phase transform (GCC-PHAT) between signals and location is completed by solving the geometry equation. In order to test the proposed algorithm, a preliminary experiment was carried out. The results of comparing experiment data shown that the new method is better than the ordinary algorithm. The experiment results also proved that the proposed method may provide not only an increase in the location but also reliability in the noise environments.

Keywords: sound source localization, Empirical Mode Decomposition, indoor environments, TOA, cross correlation-phase transform GCC-PHAT;

投稿时间：**2009-12-16**

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