

论文

基于频谱幅度起伏特性的微弱信号检测方法研究

马启明^① 王宣银^① 杜栓平^②

^①(浙江大学流体传动与控制国家重点实验室 杭州 310027)

^②(杭州应用声学研究所声纳技术国防科技重点实验室 杭州 310012)

收稿日期 2007-5-26 修回日期 2007-12-31 网络版发布日期 接受日期

摘要

该文将非线性后置处理思想引入至最小方差无失真响应(MVDR)的空间能量谱计算中,并给出其实现方法,即最终空间能量谱通过将各窄带阵列输出结果取倒数并求和得到,它不需要阵列噪声和目标信号的任何先验信息,只要阵列噪声的频谱在频段间的幅度起伏大于目标信号的频谱幅度起伏,该方法就能取得较常规处理方法更好的信号检测性能。根据最优信号检测理论,初步验证了非线性后置处理方法的性能,并利用仿真和实际数据进一步检验了其有效性,分析结果表明:非线性后置处理方法的处理增益较常规方法提高约3.5dB-4dB。

关键词 [微弱信号检测](#); [最小方差无失真响应](#); [非线性后置处理](#)

分类号 [TN911.23](#)

Research of the Method for the Weak Signal Detection Based on the Amplitude Fluctuation Property of the Frequency Spectrum

Ma Qi-ming^① Wang Xuan-yin^① Du Shuan-ping^②

^①(State Key Laboratory of Fluid Power Transmission and Control, Zhejiang University, Hangzhou 310027, China)

^②(Hangzhou Applied Acoustics Research Institute, Hangzhou 310012, China)

Abstract

Application of the non-linear post-processing method in improving the weak signal detection performance of the broadband Minimum Variance Distortionless Response (MVDR) is researched fully. The final spatial energy spectrum can be obtained by summing the reciprocal of the output power of every narrowband frequency bin. There is no need for the method proposed in this paper to know any prior information about the array noise and the target signal. The processing gain by this method compared to the general broadband MVDR can be obtained as long as the amplitude fluctuation of the array noise frequency spectrum is severer than that of the target signal. Based on the optimal signal detection theory, a method for analyzing the performance of the non-linear post-processing is also brought forward. Simulation and real data are used to validate the effectiveness of the non-linear post-processing method. Analysis results show that 3.5dB-6dB processing gain compared to the general broadband MVDR can be reached with the proposed method.

Key words [Weak signal detection](#) [Minimum Variance Distortionless Response \(MVDR\)](#) [Non-linear post-processing](#)

DOI:

通讯作者 马启明

作者个人主页 马启明^① 王宣银^① 杜栓平^②

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF \(280KB\)](#)
- ▶ [\[HTML全文\]\(OKB\)](#)
- ▶ [参考文献\[PDF\]](#)
- ▶ [参考文献](#)

服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [复制索引](#)
- ▶ [Email Alert](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

相关信息

- ▶ [本刊中 包含“微弱信号检测; 最小方差无失真响应; 非线性后置处理”的相关文章](#)
- ▶ 本文作者相关文章
 - [马启明 王宣银 杜栓平](#)