

## 基于最小二乘支持向量机的声波测距系统消噪处理

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基金项目：陕西省基金项目、江西省教育厅基金项目、西北工业大学研究生创业种子基金

摘要：

针对声波测距系统噪声复杂,淹没在噪声中的回波难以检测的问题,文章以机器统计学习理论为基础,采用最小二乘支持向量机(LS-SVM)建立系统模型,基于LS-SVM建立的模型实现了声波测距系统异常值的预测和噪声的消除,与传统的时间序列分析方法建立的自回归滑动平均求和模型(ARIMA)的消噪结果相比较,并进行了仿真分析。仿真结果表明,利用最小二乘支持向量机建立的模型预测精度高,稳定性好,泛化能力强,能有效地抑制噪声,提高回波测距仪的精度。

关键词：声波测距系统;最小二乘支持向量机;ARIMA 模型

## The Acoustic Ranging Signal De-noising Based on Least Squares Support Vector Machines

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**Abstract:**

Aiming at the problem of complex noise in acoustic ranging system and weak echoes from signal with high noise is difficult to detect, the acoustic ranging system is analyzed by the means of modern time series analysis. The acoustic ranging system model is established based on the statistical learning theory and adopted least squares support vector machines, which realized the unusual values detection and noise elimination. Comparing the de-noising result with the traditional autoregressive integrated moving average (ARIMA). It is concluded from the simulated results that the proposed methods achieve more effective inhibitions of the audio signal random noise, and improve the precision of the echo range finder.

**Keywords:** the audio ranging signal; least squares support vector machines; ARIMA;

投稿时间：2011-12-12

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