

光电信息获取与处理

小波降噪提高时延估计精度的研究

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摘要:

为了估计两个在空间上分离的传感器所接收信号之间的时间延迟, 结合小波降噪的特点, 提出了一种基于小波降噪的广义相关时延估计算法。鉴于传统阈值降噪的不足, 对小波阈值的选取进行改进, 研究出一种新的小波阈值降噪技术。该算法克服了传统广义相关法需要信号和噪声先验知识的局限性, 放宽了直接互相关法对信号和噪声的假设条件。仿真和实验结果表明该算法在低信噪比下仍能有效估计时延, 提高时延估计精度。

关键词: 小波降噪 广义相关 时延估计 低信噪比

Improving accuracy of delay estimation in wavelet denoising

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Abstract:

For estimating time difference of the received signals from two spatial separated sensors, this paper puts forward a special generalized correlation algorithm for the estimation of time delay based on wavelet denoising according to wavelet denoising theory. Since the denoising of the traditional hard and soft threshold is insufficient, the selection of wavelet threshold is improved, a new wavelet thresholding technique is developed. This algorithm is not limited by a priori knowledge of signal and noise needed in the traditional generalized correlation method, and enable direct correlation method with less stringent signal and noise conditions. Simulation and experimental results indicate that the algorithm is still effective at low signal to noise ratio (SNR), and could improve the delay estimation accuracy.

Keywords: wavelet denoising generalized correlation estimation of time delay low signal to noise ratio

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