

光通信与光信息技术

基于FPGA的小波去噪的硬件实现

王香云

山西大学 工程学院, 太原 030013

摘要: 为了解决传统频域去噪法在光信号处理中单分辨率的局限性,提出了具有多分辨性的小波去噪法,并通过对比验证其有效性。由于小波去噪实现对硬件的要求较高,采用现场可编程门阵列做硬件平台来实现基于分布式算法的小波运算,将复杂的乘法运算转化为简单的并行查表累加过程,提高了运算效率,完成了小波算法的硬件移植。最后设计了基于现场可编程门阵列的采集系统,并在其上进行了小波去噪的硬件验证。结果表明,小波去噪算法在现场可编程门阵列平台上得到了很好的实现,且去噪效果良好。

关键词: 光信号处理 小波去噪 分布式算法 查表法 现场可编程门阵列

Implementation of wavelet denoising algorithm based on FPGA

WANG Xiang-yun

Engineering College, Shanxi University, Taiyuan 030013, China

Abstract: In order to solve the limitation of single resolution in optical signal processing with traditional frequency domain denoising method, a multi-resolution wavelet denoising method was put forward. The effectiveness of wavelet denoising method was verified through contrast. According to the high requirements of hardware platform in wavelet denoising method, a field-programmable gate array (FPGA) was put forward as hardware platform. The wavelet denoising method based on distributed algorithm transforms complicated multiplication to simple parallel look-up table accumulation process. It improved the computational efficiency and completed the hardware transplantation. A storage testing system based on FPGA was designed and the hardware verification was realized. Experimental results showed that the denoising effect was well realized on FPGA.

Keywords: optical signal processing wavelet denoising distributed algorithm look-up table method FPGA

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通讯作者:

作者简介: 王香云(1979-),女,讲师,主要从事计算机仿真、嵌入式方面的研究。E-mail:

wangxiangyun12@163.com

作者Email:

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