

研发、设计、测试

三维荧光光谱分析的关键部件硬件设计研究

周志顺, 徐成, 刘彦

湖南大学 计算机与通信学院, 长沙 410082

收稿日期 2009-2-18 修回日期 2009-4-3 网络版发布日期 2010-4-21 接受日期

摘要 三维荧光光谱分析是一种面向复杂体系解析的新兴荧光分析技术。因其计算复杂度高, 在相关新型便携设备的研制过程中, 计算密集部件的硬件结构设计是关键。通过对典型的三线性分解算法进行运行时分析, 得出计算密集部件奇异值分解, 并根据算法数据和运算特点, 研究了它的硬件设计和实现方法。结果表明, 使用QR分解转置迭代方法求奇异值在牺牲了部分处理速度的条件下, 硬件面积占用小, 适合三维荧光光谱分析算法。

关键词 [三维荧光光谱分析](#) [现场可编程门阵列](#) [矩阵运算](#) [奇异值分解](#)

分类号 [TP33](#)

Research and hardware design of key component for three-dimensional fluorescence spectrometry

ZHOU Zhi-shun, XU Cheng, LIU Yan

School of Computer and Communication, Hunan University, Changsha 410082, China

Abstract

Three-dimensional fluorescence spectrometry is a new fluorescence analysis technology. Because of the high computational complexity of algorithms, in the process of development of new portable devices based on three-dimensional fluorescence spectrometry, the structure design of computing-intensive component becomes the key point. This paper gives a run-time analysis to the common three-linear analysis algorithms and discusses the hardware design and implementation method of SVD component. The result shows that, the design method of SVD hardware component based on iterative QRD has a better area efficiency with some acceptable speed sacrifice, and is more appropriate for three-dimensional fluorescence spectrometry analysis algorithms.

Key words [three-dimensional fluorescence spectrometry](#) [Field Programmable Gate Array \(FPGA\)](#) [matrix calculating](#) [Singular Value Decomposition \(SVD\)](#)

DOI: 10.3778/j.issn.1002-8331.2010.12.016

通讯作者 周志顺 yedueren@163.com

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(1161KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [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“三维荧光光谱分析”的相关文章](#)
- ▶ [本文作者相关文章](#)

- [周志顺](#)
- [徐成](#)
- [刘彦](#)