光学精密工程 » 2015, **Vol. 23** » Issue (5): 1272-1278 DOI: 10.3788/OPE.20152305.1272

基于数字微镜器件实现共焦测量的结构光参数

余卿[1,2], 叶瑞芳[1], 范伟[1]

1. 华侨大学 机电及自动化学院, 福建 厦门 361021;
2. 上海理工大学 光学工程博士后流动站, 上海 200093

Parameters of structured lights of DMD used in confocal measurement

YU Qing[1,2], YE Rui-fang[1], FAN Wei[1]

1. College of Mechanical Engineering and Automation, Huaqiao University, Xiamen 361021, China;
2. Postdoctoral Research Station of Optical Engineering, University of Shanghai Science and Technology, Shanghai 200093, China

摘要 图/表 参考文献(0) 相关文章 (15)

全文: PDF (1731 KB) RICH HTML NEW

输出: BibTeX | EndNote (RIS)

摘要

虽然采用并行共焦测量提升了共焦测量速度,但系统中的传统光分束器件参数固化后难以适应不同的被测对象。本文利用数字微镜器件(Digital Micromirror Device,DMD)可产生柔性化结构光的特点,将其作为光分束器件引入共焦测量装置以提升系统对被测对象的适应性。理论分析了DMD的空间调制方法,搭建了DMD的共焦测量装置,研究了DMD结构光参数对共焦测量轴向分辨率、横向分辨率以及图像对比度等指标的影响。实验表明,在光学系统参数匹配的条件下,结构光光点参数越小,测量分辨率越高。同时,利用DMD进行柔性化照明,改善了因光点参数小造成的图像对比度下降的问题。得到的结果为研究基于DMD的跨尺度测量方法提供了研究基础。

关键词 : 共焦测量, 分光器件, 数字微镜器件, 结构光, 柔性化照明

Abstract :

Parallel confocal measurement improves confocal measuring efficiency. However, the parameters of traditional optical divided devices (ODD) are fixed, which are not be suitable for different specimens. As the Digital Micromirror Device (DMD) is a flexible ODD and could produce different types of structured lights, this paper induces the DMDS into the confocal measurement system to improve the suitability of parallel confocal measurement devices. A modulation model of structured light produced by the DMD was analyzed, a confocal measurement device was constructed, and the effects of parameters of structured light from the DMD on the axial resolution, transverse resolution and the image contrast of measuring device were researched. The experiment results indicate that when the optical parameters are matched, the smaller the size of structured light is, the higher the measuring resolution is. Moreover, the DMD also could be applied as a flexible illuminator to improve the image contrast caused by a smaller structured light size. All of these researches provide a strong support for multi-scale measurement based on DMDs.

Key words : confocal measurement optical divided device Digital Micromirror Device(DMD) structured light flexible illumination

收稿日期: 2015-02-02

中图分类号: TH703

基金资助:

福建省自然科学基金青年创新基金资助项目(No.2013J05078);华侨大学高层次人才科研启动基金资助项目(No.12BS109)

作者简介: 余卿(1983-),男,江西新余人,博士,讲师,2005年、2011于合肥工业大学分别获得学士、博士学位,主要从事光电检测、精密机械设计方面的研究。E-mail:jorson.y@163.com;叶瑞芳(1982-),女,福建南安人,博士,讲师,2009年于厦门大学获得博士学位,主要从事光电技术、表面形貌测量方法与仪器方面的研究。E-mail:yrf2010@hqu.edu.cn

引用本文:

余卿, 叶瑞芳, 范伟. 基于数字微镜器件实现共焦测量的结构光参数[J]. 光学精密工程, 2015, 23(5): 1272-1278. YU Qing, YE Rui-fang, FAN Wei. Parameters of structured lights of DMD used in confocal measurement. Editorial Office of Optics and Precision Engineering, 2015, 23(5): 1272-1278.

链接本文:

http://www.eope.net/CN/10.3788/OPE.20152305.1272 **或** http://www.eope.net/CN/Y2015/V23/I5/1272

服务

- 把本文推荐给朋友
- 加入我的书架
- 加入引用管理器
- E-mail Alert
- RSS

作者相关文章

- 余卿
- 叶瑞芳
- 范伟