

本期目录 | 下期目录 | 过刊浏览 | 高级检索

[打印本

页] [关闭]

## 激光材料和光学元件

### 大口径拼接压缩光栅波像差研究

魏江<sup>1</sup>, 吴建宏<sup>2</sup>

1. 常熟理工学院 物理与电子工程学院, 常熟 215500;

2. 苏州大学 信息光学工程研究所, 苏州 215006

**摘要:** 为了研究大口径拼接压缩光栅的固定像差和随机像差对光学拼接的影响, 采用数值模拟的方法, 理论分析了参考光栅的衍射光斑特性。在有效判据的基础上, 得到了光栅的拼接精度。结果表明, 当拼接子光栅的波像差为 $1.0\lambda$ 时, 其最大拼缝偏差约为0.26个光栅周期, 采取人工干预后, 最大拼缝偏差增加到0.42个光栅周期。与此同时, 最大角度偏差约为 $0.71\mu\text{rad}$ , 两种特性参量均比无像差时的拼接要求大幅度降低。这一结果对高能皮秒激光装置的改进有一定的积极意义。

**关键词:** 激光光学 拼接光栅 波像差 远场衍射 拼缝偏差 角度偏差

### Study on wave aberration of large-aperture mosaic compression grating

WEI Jiang<sup>1</sup>, WU Jianhong<sup>2</sup>

1. School of Physics and Electronic Engineering, Changshu Institute of Technology, Changshu 215500, China;

2. Institute of Information Optical Engineering, Soochow University, Suzhou 215006, China

**Abstract:** In order to analyze the effects of fixed and random wave aberration on the large-aperture mosaic compression gratings, by numerical simulation, the far-field characteristics for referenced gratings were studied. On the basis of the precise evaluation criterion, the tiling accuracy of the mosaic gratings was obtained. The results showed that the maximum piston error of the tiling precision was about 0.26 grating period when the

#### 扩展功能

#### 本文信息

Supporting info

PDF(1216KB)

[HTML全文]

参考文献

[PDF]

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

引用本文

Email Alert

文章反馈

浏览反馈信息

#### 本文关键词相

#### 关文章

激光光学

拼接光栅

波像差

远场衍射

拼缝偏差

角度偏差

#### 本文作者相关

#### 文章

魏江

吴建宏

PubMed

wave aberration of sub-gratings was  $1.0\lambda$ . After manual intervention, the maximum piston error was about 0.42 grating period and the maximum tip-tilt error was  $0.71\mu\text{rad}$  approximately, which were both lower than before. The research is benefit for the improvement of high energy picosecond laser device.

Keywords: laser optics tiling grating wave aberration far-field diffraction piston error tip-tilt error

收稿日期 2013-07-22 修回日期 2013-08-21 网络版发布日期 2014-01-06

DOI: 10.7510/jgjs.issn.1001-3806.2014.02.017

基金项目:

国家自然科学基金资助项目 (61178046); 江苏省高校自然科学研究重大基础研究资助项目 (11KJA140001)

通讯作者: 吴建宏

作者简介: 魏江 (1971-), 女, 硕士研究生, 现主要从事光栅拼接方面的研究。

作者Email: jhwu@suda.edu.cn

#### 参考文献:

- [1] JIANG Sh E, DING Y K, MIU W Y, *et al.* Recent progress of inertial confinement fusion experiments in China [J]. Science China, 2009, 39(11): 1571-1583(in Chinese).
- [2] LIU H, XU L B, PENG Zh T, *et al.* Temporal multiplexing for measurement of temporal profile on SG-III prototype laser facility[J]. Laser Technology, 2010, 34(2): 157-160(in Chinese).
- [3] CHEN X R, GENG K, WU J H. Nondestructive testing method for dielectric reflection grating [J]. Laser Technology, 2005, 29(4): 423- 425(in Chinese).
- [3] TETSUO H. Far-field pattern analysis for an arrayed grating compressor [J]. Applied Optics, 2004, A43(4): 1362-1365.
- [4] KESSLER T J, BUNKENBURG J, HUANG H. Demonstration of coherent addition of multiple gratings for high energy chirped pulse amplified lasers[J]. Optics Letters, 2004, 29(6): 635- 637.

- [5] ZENG L J, LI L F. Optical mosaic gratings made by consecutive, phase-interlocked, holographic exposes using diffraction from latent fringes [J]. *Optics Letters*, 2007,32(9): 1081-1083.
- [6] LI Ch M, WU J H, CHEN X R, *et al*. Research on the multi-exposure method to fabricate pulse compression mosaic grating[J]. *Acta Optica Sinica*, 2009, 29(7):1943-1946(in Chinese).
- [7] WEI J. Method to mosaic diffraction gratings [J]. *Journal of Changshu Institute of Technology*, 2007,21(10): 51-54(in Chinese).
- [8] WEI J, WU J H. Theoretical study on wave