

计量测试

用迈克尔逊干涉仪测量全息干板膜厚度

蒋礼, 罗少轩, 阳艳, 杨科灵

中南大学物理科学与技术学院, 湖南长沙410083

收稿日期 修回日期 网络版发布日期 2006-11-14 接受日期

摘要 全息干板膜的厚度是全息干板的重要参数之一。使用迈克尔逊干涉仪和白光光源对2种全息干板膜厚度进行测量, 并对测量结果误差进行分析, 给出了测量误差与膜厚及折射率之间的关系以及此方法的适用范围。研究结果表明: 在膜厚从8 μm 增至41 μm 的过程中, 测量结果的绝对误差 $\leq 2\mu\text{m}$ 且变化很小, 相对误差则从14.1%降到了2.2%。随着膜厚的增加, 相对误差明显降低; 折射率 n 也参与了误差传递, 其值与测量误差呈类似反比关系; 当 n 值在1.5附近时, 为保证测量的准确性, 所测膜厚 $\geq 40\mu\text{m}$ 。最后指出, 迈克尔逊干涉仪在测量全息干板膜等较厚的薄膜时, 具有测量范围大, 结果较准确等优点。

关键词 [迈克尔逊干涉仪](#) [白光干涉](#) [全息干板膜](#) [膜厚测](#)

分类号

Thickness measurement of thin film for holographic plate by Michelson interferometer

JIANG Li, LUO Shao-xuan, YANG Yan, YANG Ke-ling

School of Physics Science and Technology, Central South University, Changsha 410083, China

Abstract Thin film thickness is one of the most important parameters for holographic plate. Thin film thicknesses of two types of holographic plates were measured by Michelson interferometer which took the white light as its incident source. By analyzing the errors of the results, the relation of the measurement errors to thin film thickness and refractive index, and the applicable range of this method were studied. The result shows that with the increasing of film thickness, when it is from 8 μm to 41 μm , the absolute errors are $\leq 2\mu\text{m}$ with little fluctuations, but the relative errors decrease from 14.1% to 2.2%. The value of refractive indexes contributes to error propagation, and it is inversely proportional to absolute errors. In order to guarantee the validity of results, the thicknesses of films should be $\geq 40\mu\text{m}$ when the refractive indexes are about 1.5. There are some advantages, such as a large measuring range, fewer experiment instruments and accurate result, when Michelson interferometer is used to measure some thicker thin films.

Key words [Michelson interferometer](#) [white light interference](#) [thin film of holographic plate measurement of thin film thickness](#)

DOI:

通讯作者

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(209KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [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“迈克尔逊干涉仪”的相关文章](#)
- ▶ [本文作者相关文章](#)

- [蒋礼](#)
- [罗少轩](#)
- [阳艳](#)
- [杨科灵](#)