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论文

大尺寸物光波面彩色数字全息高质量重建研究

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摘要:

为解决检测面尺寸较大时CCD难以得到高质量数字全息图的问题,本文利用负透镜设计光学系统让CCD接收来自物体的缩小虚像,以球面波为参考波,使用单色CCD近距离得到三种色光照射下的大尺寸彩色物体的数字全息图,然后采用可控放大率波面重建算法得到同一尺寸的数字全息重建像,合成彩色数字全息重建像.同时,使用两种消零级方法去除零级干扰,提高重建像质量,一种方法利用空间光调制器相移技术在参考光中加入一次任意相移,记录两幅数字全息图,消除重建零级像|另一种方法使用“无干扰全息图”消除重建零级像及共轭像.本文讨论结果可为大物体彩色数字全息及多波长数字全息检测应用提供有益的参考.

关键词: 彩色数字全息 角谱衍射 消零级 空间光调制器

Color Digital Holographic High Quality Reconstruction of Large Size Object

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Abstract:

In order to improve the quality of digital hologram of large size object,a method of recording large size object with a short distance is presented.With spherical wave as reference wave,the digital hologram of large size color object image,which is illuminated with differently wavelengths (red,green,blue),is recorded by using of optic system with negative lens.Then each monochromatic holographic image is reconstructed with the same magnification,and the corresponding digital color holographic image is acquired by accurately synthesizing the reconstructed monochromatic images.In order to improve quality of reconstruction image,two elimination zero-order methods are proposed.At first,the zero-order is eliminated with two recorded hologram,and SLM is used to change the record parameters.And the zero-order and conjugate images are eliminated by using “no disturb hologram” in another method.The result will provide a reference in holography application and digital holographic test of large size object.

Keywords: Color digital holography Angular spectrum Zero-order elimination Spatial Light Modulator(SLM)

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