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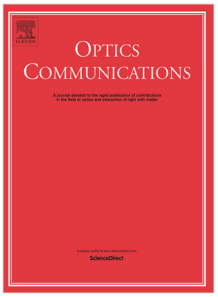

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Numerical study of color holographic display from single computer-generated cylindrical hologram by radial-division method

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Abstract

A method of color holographic display from computer-generated cylindrical hologram (CGCH) based on radial-division is proposed. A single phase-only CGCH is calculated by using a multi-cylindrical surface (MCS) based iterative algorithm. This algorithm allows calculating a phase CGCH from red, green and blue components of a color object simultaneously. The radial distances for red, green and blue component objects are calculated according to the ratio of RGB wavelengths. When the hologram is illuminated by three laser beams of RGB colors, it can then reconstruct the wanted RGB components on the same radial position to obtain a color compound. Numerical simulation results demonstrate that simple 3D object can be reconstructed from single phase-only CGCH at the expected position.

Key words: Holographic display; Computer holography; Color holography

1. Introduction

Holographic display can reconstruct all the three-dimensional information of an object in space from a computer-generated hologram (CGH), and is considered to be the most potential technique to achieve true 3D display without any wearable devices. Common methods for holographic display are based on the planar CGHs. In the past decade, color holography gains a great development. Currently, color holographic display can be realized by using only one spatial light modulator (SLM). Several approaches which employ one SLM for realizing full-color holographic display includes: the depth-division method (DDM) [1,2], the time-division method (TDM) [3-6], the space-division method (SDM) [7-9], the frequency-division method (FDM) [10] and other similar methods [11-13]. All of these methods are based on the calculation and display of one planar CGH.

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