

Full-color CGHs created by stacking monochromatically-transferred volume CGHs

Orie Kunieda, Hiroki Nakao, Kyoji Matsushima
Department of Electrical and Electronic Engineering, Kansai University
3-3-35 Yamate-cho, Suita, Osaka 564-8680, Japan

ABSTRACT

Computer holography has been steadily developed for the last decade. As a result, high-definition computer-generated holograms (CGHs) composed of several billion or tens of billion pixels are produced and reported. However, it is very difficult to reconstruct full-color images by these high-definition CGHs.

To reconstruct full-color images, several methods have been invented and proposed before. For example, dichroic mirrors are used to superimpose RGB color images. Sharp full-color images are reconstructed with high contrast in this method. However, this method needs complicated, expensive and non-portable optical system. Therefore, the CGHs are unsuitable for exhibition. Another technique uses RGB color-filters. The CGH produced by this method is portable and reconstructs full-color images very easily, but the image is not very sharp and vivid. This is because RGB color filters commonly have wideband spectral properties and the fringe pattern is spatially divided.

To get over the problem, we propose a novel technique for full-color reconstruction. In this method, three printed CGHs are transferred to three volume CGHs with the wavelength corresponding to RGB colors, and then stacked to superimpose the RGB images. This CGH is also portable and the image is sharp and vivid as compared with that by RGB color-filters. However, the RGB images have a little position shift because of aberration caused by the thick glass substrate.

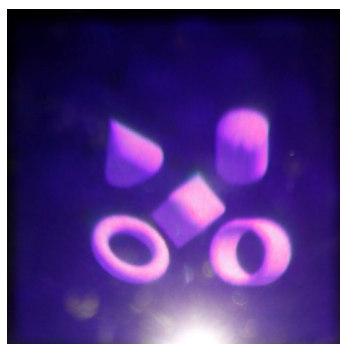
In this paper, we present techniques to create the stacked full-color volume CGHs and compensate thickness and refractive index of the glass substrate. The fabricated full-color CGHs are demonstrated to verify the techniques.

Keywords: Computer holography, computer-generated hologram, full-color CGH, volume CGHs

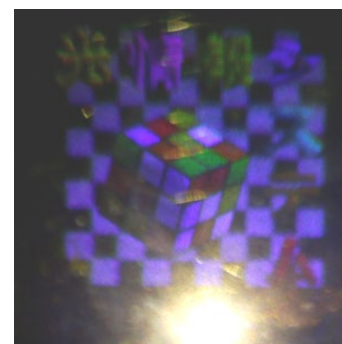
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*kunieda@laser.ee.kansai-u.ac.jp; phone +81-090-2063-3383; fax +81-6-6368-0933



Example 1



Example 2