

Design of Replication System for Computer-Generated Hologram in Optical Component Application

Authors : Chih-Hung Chen, Yih-Shyang Cheng, Yu-Hsin Tu

Abstract : Holographic optical elements (HOEs) have recently been one of the most suitable components in optoelectronic technology owing to the requirement of the product system with compact size. Computer-generated holography (CGH) is a well-known technology for HOEs production. In some cases, a well-designed diffractive optical element with multifunctional components is also an important issue and needed for an advanced optoelectronic system. Spatial light modulator (SLM) is one of the key components that has great capability to display CGH pattern and is widely used in various applications, such as an image projection system. As mentioned to multifunctional components, such as phase and amplitude modulation of light, high-resolution hologram with multiple-exposure procedure is also one of the suitable candidates. However, holographic recording under multiple exposures, the diffraction efficiency of the final hologram is inevitably lower than that with single exposure process. In this study, a two-step holographic recording method, including the master hologram fabrication and the replicated hologram production, will be designed. Since there exist a reduction factor M^2 of diffraction efficiency in multiple-exposure holograms (M multiple exposures), so it seems that single exposure would be more efficient for holograms replication. In the second step of holographic replication, a stable optical system with one-shot copying is introduced. For commercial application, one may utilize this concept of holographic copying to obtain duplications of HOEs with higher optical performance.

Keywords : holographic replication, holography, one-shot copying, optical element

Conference Title : ICDHTDI 2018 : International Conference on Digital Holography and Three-Dimensional Imaging

Conference Location : Rome, Italy

Conference Dates : September 17-18, 2018