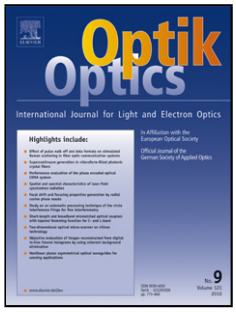

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Double color image encryption scheme based on off-axis holography and maximum length cellular automata

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Abstract: A double color image encryption scheme based on off-axis holography and maximum length cellular automata (MLCA) is proposed. The original image is separated into three channels: red, green, and blue, and each channel is independently encrypted by using MLCA mask to make the intensity values change in the spatial domain. Then the reference waves with different incident angles are introduced into the off-axis Fourier transform hologram to accomplish double color image encryption. The system parameters of the off-axis Fourier transform in each channel are also keys in image encryption and decryption. When we want to decrypt one of the original images, the reference wave with certain incident angle and corresponding MLCA mask are used. Some numerical simulations have demonstrated to show the effectiveness of the proposed scheme, and we present the results of our preliminary experiments.

Keywords: Image encryption; off-axis holography; maximum length cellular automata

1 Introduction

The image encryption technique, by its capability to ensure the security of information transmission and communication, has attracted a lot of attention since Refregier and Javidi [1] proposed the double random phase encryption (DRPE) method for the first time in 1995. Various optical methods such as optical transforms [2-5], interferometry [6], interference [7] and holography [8] have been proposed for image encryption because of high speed of parallel processing and multiple key parameters. Most of the encryption algorithms mentioned above did not consider image compression or data compression, thus they cannot realize compression and encryption simultaneously. To solve this problem, compressive sensing [9-10] is utilized to construct new encryption scheme. As all we know, the security performance of a cryptosystem is of the major concern. A cryptosystem can be claimed to be secure enough only if it can endure the safety evaluation by