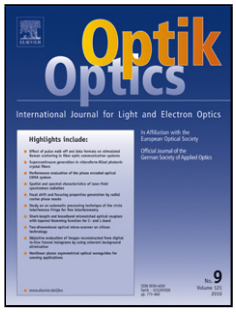

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Information authentication using sparse representation of double random phase encoding in fractional Fourier transform domain

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Abstract

This paper presents an information authentication scheme using sparse representation of double random phase encoding in fractional Fourier transform domain. Different from traditional cryptographic applications, only sparse version of the ciphertext is available at the receiver end. The decrypted image is unrecognizable and of no meaningful information of the plaintext, which can enhance the resistance against various attacks. The decrypted image can be authenticated using nonlinear optical correlation approach. Numerical simulations have been carried out, and the results prove the effectiveness and noise resistance of the proposed scheme.

Keywords: double random phase encoding, sparse representation, fractional Fourier transform, information authentication

1. Introduction

Benefiting from the superior advantageous such as parallel processing, high speed, large storage memories and multi-dimensional characteristics, optical security systems have drawn long-term concerns since the pioneering double random phase encoding (DRPE) had been achieved in 1995 [1]. The DRPE architecture is implemented based on the $4f$ optical system to encrypt the primary image into stationary white noise [2]. This pioneering achievement has paved the way for numbers of optical security and encryption systems subsequently

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