

Single-channel color image encryption algorithm based on fractional Hartley transform and vector operation

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Abstract A single-channel color image encryption algorithm is proposed by combining fractional Hartley transform (FRHT) with vector operation. The original color image is decomposed into RGB components and the G and B components are encrypted into two phase-only masks θ_G and θ_B with vector operation, respectively. The R , θ_G and θ_B are transformed by FRHT and vector operation twice to obtain amplitude, random phase and decryption phase key. The new amplitude combined with the random phase is transformed by FRHT once more and then the result is scrambled by the chaotic scrambling to strengthen the security of the algorithm. The private phase key is dependent on the original image, which makes the proposed encryption algorithm more secure than the linear color image encryption algorithm based on the double random phase encoding in FRHT. Simulation results demonstrate the security and effectiveness of the proposed algorithm.

Keywords Vector operation · Fractional Hartley transform · Image encryption · Information security

1 Introduction

With the civilization and progress of the society, people pay more and more attention to the protection of personal privacy. Image is widely used as an effective information carrier because of its vivid and lively. In order to ensure the security of the private image information, image encryption is one of the effective approaches. Since Refregier and Javidi [13] first proposed the double random phase encoding in Fourier transform (FT) domain in 1995, it has been extended

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