论文

基于两步正交相移干涉的振幅图像光学加密技术

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摘要：

提出一种基于两步正交相移干涉的光学图像加密技术.这种相移干涉数字全息只要记录两幅干涉图,不需要记录物光波和参考光波的强度信息,就可以再现没有零级像和共轭像的再现像.物光波对应的光路经过两次菲涅尔变换,并结合双随机相位编码.参考光分别引入0和π/2相位,用数字化记录介质记录两幅数字全息图作为加密图像.解密时只要获得正确的密钥,经过简单的计算就可以重建清晰的原始图像.模拟实验验证了它的可行性和有效性,分析了抗裁剪和噪音的鲁棒性.

关键词： 加密　相移干涉　数字全息　菲涅尔变换　随机相位

Amplitude Image Optical Encryption Based on Two-step-only Quadrature Phase-shifting Interferometry

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Abstract:

A novel optical image encryption is proposed based on two-step-only quadrature phase-shifting interferometry. Only two interferograms are needed to reconstruct a zero-order-and twin-image-free hologram in this phase-shifting digital holography interference. Such technique precludes the need from recording either the reference wave or the object wave intensity. The object wavefront propagates with two Fresnel transforms in the light path, combined with the double random phase encoding. The following is that introducing zero and π/2 phase into reference waves respectively and recording two digital holograms as encrypted image. As long as the correct key is given in the decryption, a clear original image can be reconstructed by a simple calculation. The feasibility and its robustness against occlusion and noise attacks are verified by a series of numerical simulations.

Keywords: Encryption　Phase-shifting interferometry　Digital holography　The Fresnel transform　Random phase

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