

学术探讨

一种新的复波恢复方法——FastICA

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摘要 在进行数字全息重构过程中, 常用的方法如衍射和滤波方法都会受到零级项和共轭项的影响, 造成对复波的振幅和相位信息的损失, 无法有效地恢复复波。提出一种基于快速独立分量分析 (Fast Independent Component Analysis, FastICA) 的方法来进行复波恢复, 通过 CCD 获取同一物体的 3 幅干涉全息图来构成观测信号, 然后用 FastICA 从被观测信号中分离出只包含复波振幅和相位的信息, 从而有效抑制了零级项。实验结果表明, 这种方法可以较好地恢复原复波的振幅和相位, 在频谱混叠的情况下, 能有效恢复原来复波信号。

关键词 [数字全息](#) [复波恢复](#) [快速独立分量分析 \(FastICA\)](#) [零级项和共轭项](#)

分类号

New method of complex-wave retrieval— FastICA

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Abstract

During the process of reconstruction of digital holography, some common methods such as diffraction and filtration are affected by the zero-order terms and the twin-image, so the loss of the amplitude and phase information of the complex-wave is unavoidable, and we can't retrieve the complex-wave effectively. This paper adopts the method of Fast Independent Component Analysis to retrieve the complex-wave. At the beginning, we can capture three frames of holograms of the same object as the observed signal, secondly, separate the information which only includes the amplitude and the phase from the observed signal by using the FastICA, the method can restrain the zero-order terms effectively. The method can better retrieve the amplitude and phase of the original complex-wave through the experiment even when there is a frequency spectrum mixture in the holograms.

Key words [digital holography](#) [complex-wave retrieval](#) [Fast Independent Component Analysis \(FastICA\)](#) [zero-order terms and twin-image](#)

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