Objective evaluation of information retrieved from digitally compressed in-line holograms

Joewono Widjaja*

Institute of Science, Suranaree University of Technology, Nakhon Ratchasima 30000, Thailand

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Abstract

Quality of information retrieved from digitally compressed in-line holograms are objectively studied by evaluating the measured recording distance and its reconstructed image. A lossy-JPEG algorithm is used for compression of the in-line Fraunhofer holograms, while the information retrieval is accomplished by using complex amplitude based numerical reconstruction method. The results show that the error in measurement of recording distance and the degradation of the reconstructed image are not significant although the hologram is compressed by about 60 times. This provides a practical solution to the storage and data transfer problems in on-line digital in-line holography.

Keywords: In-line Fraunhofer holography; Particle sizing; Image compression

1. Introduction

In the past decades, applications of in-line Fraunhofer holography to the fields of science and engineering such as studies of dynamic micro-objects [1], fog [2], aerosol [3], cloud droplets [4], oceanic particles [5], and bio-stabilized sediments [6] have been reported. The technique provides a useful method for storing information, size and relative position, of a three-dimensional (3-D) distribution of objects in holographic...