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Holographic Memories with Encryption-selectable Function

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Abstract

Volume holographic storage has received increasing attention owing to its potential high storage capacity and access rate. In the meanwhile, encrypted holographic memory using random phase encoding technique is attractive for an optical community due to growing demand for protection of information. In this paper, encryption-selectable holographic storage algorithms in LiNbO3 using angular multiplexing are proposed and demonstrated. Encryption-selectable holographic memory is an advance concept of security storage for content protection. It offers more flexibility to encrypt the data or not optionally during the recording processes. In our system design, the function of encryption and non-encryption storage is switched by a random phase pattern and a uniform phase pattern. Based on a 90-degree geometry, the input patterns including the encryption and non-encryption storage are stored via angular multiplexing with reference plane waves at different incident angles. Image is encrypted optionally by sliding the ground glass into one of the recording waves or removing it away in each exposure. The ground glass is a key for encryption. Besides, it is also an important key available for authorized user to decrypt the encrypted information.