

홀로그래픽 정보 저장 장치에서의 실시간 틸트 서보 제어

Real Time Tilt Servo Control of The Holographic Data Storage System

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Abstract

The purpose of this paper is real time tilt servo control of the holographic data storage system. Holographic data storage device is a next generation data storage device with high storage density, high transfer rate and short access time. This device is very sensitive to a disturbance due to the enormous storage density. As to the recording material changed disc type, the media continuously vibrates as the disc rotates. When disc rotates, deviation, eccentricity and unbalance disturbance are occurred. This disturbances cause disc tilt, finally reference beam does not illuminates to correct incidence angle. Therefore real time tilt servo control is essential. In this paper, the algorithm is proposed to make real time tilt detection in angle multiplexing of the holographic data storage system with an additional servo beam and the experiments are performed.

Key Words : HDSS(Holographic Data Storage System), Tilt Servo, Tilt Disturbance, Angle Multiplexing.

1. Introduction

Entered 21 century, information and knowledge is more important and increased. As to high density storage device is essential. Today optical data storage medias have storage density of 0.65 Gbit/in² (CD : Compact Disk), 4.7 Gbit/in² (DVD : Digital Versatile Disk) and 25 Gbit/in² (HD-DVD), etc. It is expected that the next generation storage system should have storage density more than 100 Gbit/in² and storage capacity more than 150 GB. And addition to those features it must have fast data transfer rate.[1][3]

Many researches have been studied until now however any storage device cannot satisfy those demands certainly. At this point of view holographic data storage system is one of a strong candidate for the next storage device. It has storage capacity about tera bytes, storage density more than 100 Gbit/in² and transfer rate faster than 1 Gbit/s. Its large storage capacity is realized by means of multiplexing schemes, such as angular,



Fig. 1 Angle direction disturbance & effect

wavelength, shift, phasecode, polytopic, collinear multiplexing.

However the recording material changed disc type, the media continuously vibrates as the disc rotates. When disc rotates, deviation, eccentricity and unbalance disturbance is occurred. This disturbance cause disc tilt, finally, reference beam is not illuminates correct incidence angle. And then reconstructed image of the diffraction efficiency is decreased.[2] Therefore real time tilt compensation is essential.

2. Tilt detection algorithm

Basic principle of tilt detection method is Snell's law. A light wave traveling in a medium with a greater refractive index ($n_1 > n_2$) suffers reflection and refraction at the boundary.[6] Refracted quantity is different an angle of incidence and thickness of medium..

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