References for: Magnetic and Optical Disk Control: Parallels and Contrasts

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March 5, 2001

Abstract

This document provides a set of annotated references for the 2001 American Controls Conference Proceedings version of the paper, *Magnetic and Optical Disk Control: Parallels and Contrasts.* This paper is an invited tutorial paper, MA13-2.

1 Introduction

The following references pertain to the introduction. A basic description of the disk drive control problem has been provided in [1, 2].

Some of the most common references for optical recording are [3, 4, 5]. Note that Bouwhuis *et. al.* [3] is one of the most popular texts and yet is out of print. Pohlmann [5] is really a text describing compact disks.

2 Markets

The following references deal with trying to fly optical heads in the near field to compete directly with hard disks [6, 7, 8, 9]. Difficulties are described in [10, 11]. Quinta's difficulties are described in [12, 13, 14] and Terastor's in [15, 16, 17].

3 Spindle Control

References that describe the operating modes of optical disk spindles (CAV or CLV) are [5, 18]. [1] is a good source for spindle information on hard disks.

4 Disks, Disk Stacks, and Formatting

The formatting of a hard disk is described in [1]. Discussions of replacing hard disk ball bearing spindles with air or fluid bearing spindles are in [19, 20, 21, 22, 23, 24].

Optical disk layouts are described in [5, 18].

A discussion of the effects of shrinking hard disk size, from a business perspective is in Christensen [25]. Note that this book is more of a business book on the theory of disruptive technologies but it uses the hard disk industry as its template.

References for small disk drives are in [26, 27, 28].

The use of harmonic compensation in disk drives (both hard disks and optical) is described in [29, 30, 31, 32, 33, 34].

PERM, a method of patterning position information on hard disks is described in [35].

5 Actuators, Lenses, and Heads

A description of drives with high speed spindles is in [22, 36].

A description of optical drives made by Philips with rotary actuators is in [37, 38, 39].

5.1 Resonances

A description of hard disk resonances in current drives is in [40].

Optical disk actuators are described in [37, 38, 39].

5.2 Friction

Discussions of friction in hard disks are in [41, 42, 43, 44].

5.3 Dual Stage Actuators

Dual stage actuators for hard disks are described in the following. Micromacined actuators in [45, 46, 47, 48, 49, 50, 51, 52, 53]; piezoelectric actuators in [54, 53]. Instrumented suspensions are discussed in [55, 40], allowing control much like flexible robot arms [56, 57]. Stiffening actuators is discussed in [58].

6 Servo Signals

6.1 Position Encoding Methods

Position encoding methods for optical disk drives are described in [3, 4, 5, 18, 59, 60, 61, 62, 63].

6.2 Focus and Tracking Error Signal Generation

Focus and tracking error signal generation of optical disk drives is described in [3, 4, 5, 64].

6.3 Position Error Signal Generation

Some descriptions of position error signal generation in hard disks are in [65, 66, 67, 68, 69, 70].

[71, 72].

6.3.1 Servo Demodulation in Hard Disks

Some discussion of customizable coherent demodulation in hard disks is in [66, 73, 74].

6.4 Noise Sources in Optical Servo Signals

6.5 Noise Sources in Magnetic Servo Signals

Some discussion of noise sources for MR heads in hard disks is in [66, 69, 70, 74].

Some historical context for disk heads in [75, 76],.

Micro-jogs are mentioned in [77].

MR heads and their nonlinear effects are described in [78, 79, 80, 81, 82, 83, 77, 69, 70, 66, 73].

6.6 A Comparison of Servo Signals

Multirate control for hard disks are described in [84, 85, 86]. Use of multirate on auxiliary sensors in hard disks is discussed in [87, 40].

7 Application Related Issues

Accelerometer feedforward is discussed in [88, 89, 90, 91, 87, 92, 93, 94, 95].

Use of fluid bearing spindles for hard disks in consumer devices is described in [22, 23, 24].

8 Noise Sources

Description of noise sources in hard disks are in [96, 97, 71, 98].

Description of the effects of air flows in hard disks are in [99, 100, 101, 102, 103, 104, 105, 106, 107, 108].

8.1 Repetitive and Spectral Disturbances

Spindle and disk vibrations are described in [96, 109, 97].

Repetitive control and adaptive feedforward harmonic cancellation [29, 30, 31, 32].

Glass substrates are mentioned in [110, 22, 36].

8.2 External Shock and Vibration

External shock and vibration is in [89, 111, 112, 113, 114, 88, 87, 92, 95, 93, 94, 115].

8.3 Broadband Noise

Broadband noise in hard disks is described in [71, 116, 117, 118, 72, 119, 120].

Second stage actuation is described in [46, 47, 48, 50].

9 Seeks

PTOS (Proximate Time-Optimal Servomechanism) is described in [121, 122, 123, 124], the original hard disk servo is described in the classic paper by Oswald [125]. Residual vibration prevention is described in [126, 127]. Optical disk seeks are described in [128, 129].

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