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Sliding Mode Control of Double-Inverted Pendulum

with Particle Swarm Optimization

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Abstract

This thesis presents a comprehensive study of sliding mode control (SMC) applied to double-inverted pendulum (DIP) stabilization, with controller gains optimized using particle swarm optimization (PSO).

[More content to be added in Day 2]

Acknowledgments

[Acknowledgments to be added in Day 2]

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Nomenclature

[Symbol definitions to be added in Day 2]

chapter**Chapter 0**

Introduction

This chapter introduces the double-inverted pendulum control problem. The inverted pendulum has been studied extensively in control theory literature [**?** **?**].

See Chapter for a comprehensive literature review.

section**0.0 Motivation**

The control of underactuated systems like the double-inverted pendulum presents significant challenges due to nonlinear dynamics and instability.

section**0.0 Objectives**

The objectives reference Section and aim to develop robust sliding mode controllers.

[More content to be added in Day 3]

chapter**Chapter 0**

Literature Review

This chapter reviews existing work on sliding mode control mentioned in Chapter . [More content to be added in Day 4]

chapter# Chapter 0

Chapter 03

[Content to be added]

chapter# Chapter 0

Chapter 04

[Content to be added]

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Chapter 05

[Content to be added]

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Chapter 06

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chapter# Appendix

Lyapunov Stability Proofs

[Lyapunov function derivations to be added]

chapter# Appendix

Code Listings

[Controller implementation code to be added]

chapter# Appendix

Benchmark Data

[Detailed benchmark tables to be added]

chapter# Appendix

Configuration Files

[System configuration parameters to be added]