Adaptive Position Control of a Levitating Ball

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Abstract – insert abstract here.

Keywords – KeyWord1, KeyWord2, Some KeyWordPhrase Here

I. INTRODUCTION

Introduction here

II. problem description

Problem description here

iII. SySTEM DESCRIPTION

System description here.

|  |  |
| --- | --- |
|  | (1) |
|  | (2) |
|  | (3) |

iv. MRAS CONTROL

Methodology here.

A. MIT Rule

A model reference adaptive control was implemented with with a 2nd order model (1) and controller in (2):

|  |  |
| --- | --- |
|  | (1) |
|  | (2) |

When compared with the system transfer function, the model following conditions are as follows:

|  |  |
| --- | --- |
|  | (3) |
|  | (4) |

Equations (1) and (2) are combined with the model following condition and system transfer function to yield derivative of the adaptation laws in (5) and (6):

|  |  |
| --- | --- |
|  | (5) |
|  | (6) |

The adaption rates and were obtained from finite difference equations. Initial values of and were set equal to the model following condition. Initial condition of their derivatives were set equal to zero.

|  |  |
| --- | --- |
|  | (7) |
|  | (8) |

B. Normalized MIT rule.

The adaptation laws were normalized as follows:

|  |  |
| --- | --- |
| , | (9), (10) |
|  | (11) |
|  | (12) |

Something something normalization to provide stability. Where is calculated from (8), (7) as well as (5), (6) for and , respectively.

C. Experimentation and Results

Model free control stuff here.

|  |  |
| --- | --- |
|  | (1) |

C. Other Controller

Other controller here

iv. DISCUSSION

Testing and results here

A picture containing chart

Description automatically generated

Fig. 1. Figure example here

Table 1. IEEE Table Caption

|  |  |  |
| --- | --- | --- |
|  | Your table |  |
|  |  |  |
|  |  |  |

V. CONCLUSION

Discussion here

REFERENCES

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2. D. Boase and C. Plante, “PID Family and Fuzzy Logic Control of Real Non-Linear System,” University of Ottawa, Apr. 2021.