**ME370: ADAMS LAB**



**Department of Mechanical Engineering,**

**IIT Bombay**



**Session 10 Report**

**Group / Section:** A8

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**Date:** April 10,2023

**Given Information**

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|  | Information for Q1 | | | |
| Parameters | Link 1 Length | m1 | m2 | Link 2 Length |
| Values | 1951 mm | 10 kg | 2 kg | 3980 mm |

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Information for Q2 | | | | | | |
| Parameters | Separation | Box edge | | Mass of Box A | | | Mass of Box B |
| Values | 10 m | 1 m | | 3 kg | | | 3 kg |
| Parameters | Velocity of Box B | Coefficients of Friction | | | | | Final Separation |
| Values | 10 m/s | A | 0.3 | | B | 0 | Between 3-5 m |

**Question 1 (PID Controller for Two Link System)**

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| **ISOMETRIC VIEW OF TWO LINK MECHANISM** |
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| **FRONT VIEW OF TWO LINK MECHANISM** |
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| **HORIZONTAL DISPLACEMENT OF COM OF 2ND LINK VS TIME** |
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| Parameters | Kp | Kd | Ki |
| Values | 7 | 35000 | 0 |

**OUTPUTS**:

We can clearly see from the above plot that the deviation from mean (vertical) is always less than 0.0175 radians (1°).

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| **ANGULAR DEVIATION OF LINK 2 FROM VERTICAL VS TIME** |
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**Question 2 (Two Box System)**

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| **ISOMETRIC VIEW OF TWO BOX SYSTEM** |
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| **FRONT VIEW OF TWO BOX SYSTEM** |
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| **DISTANCE BETWEEN THE TWO BOXES**  **(CONTACT FORCE IS ENABLED, FORCE IS CONTROLLED)** |
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| Parameters | Kp | Kd | Ki | Gain |
| Values | 10000 | 8000 | 0 | 150 |

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| **DISTANCE BETWEEN THE TWO BOXES**  **(CONTACT FORCE IS ENABLED, VELOCITY IS CONTROLLED)** |
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| **DISTANCE BETWEEN THE TWO BOXES**  **(CONTACT FORCE IS DISABLED, FORCE IS CONTROLLED)** |
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| --- | --- | --- | --- |
| Parameters | Kp | Kd | Ki |
| Values | 12000 | 6000 | 0 |

**OUTPUTS**:

* We observe from the plot that Body 1 converges to a value close to 4m and then follows Body 2 with same velocity.
* A very small steady state error is observed. If we use PID, this is be easily eliminated using Ki. Higher values of Gain lead to faster convergence and lower steady state errors.
* We see from the plot that it converges to 4m and oscillates in the 3-5m as desired. Also, we notice that displacement goes negative too, that is Body 1 overshoots Body 2 before reversing direction initially

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