ME370: ADAMS LAB

Department of Mechanical Engineering,
IIT Bombay

Session 10 Report

Group / Section: A8
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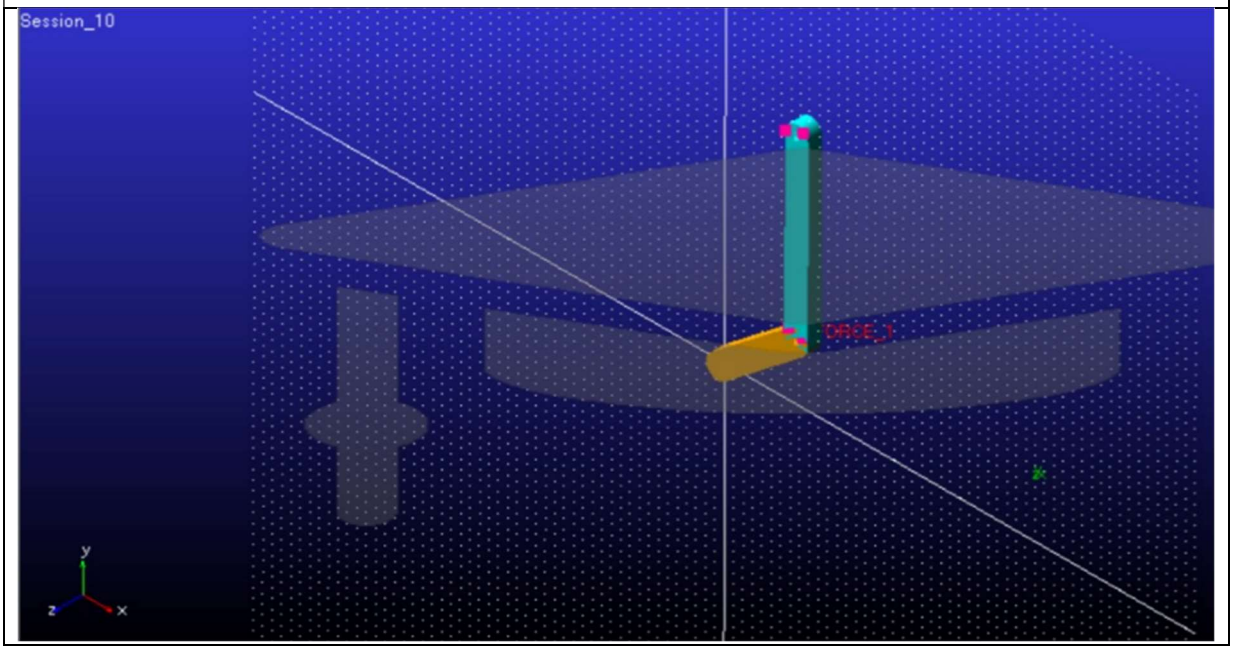
Given Information

	Information for Q1			
Parameters	Link 1 Length	m_1	m_2	Link 2 Length
Values	1951 mm	10 kg	2 kg	3980 mm

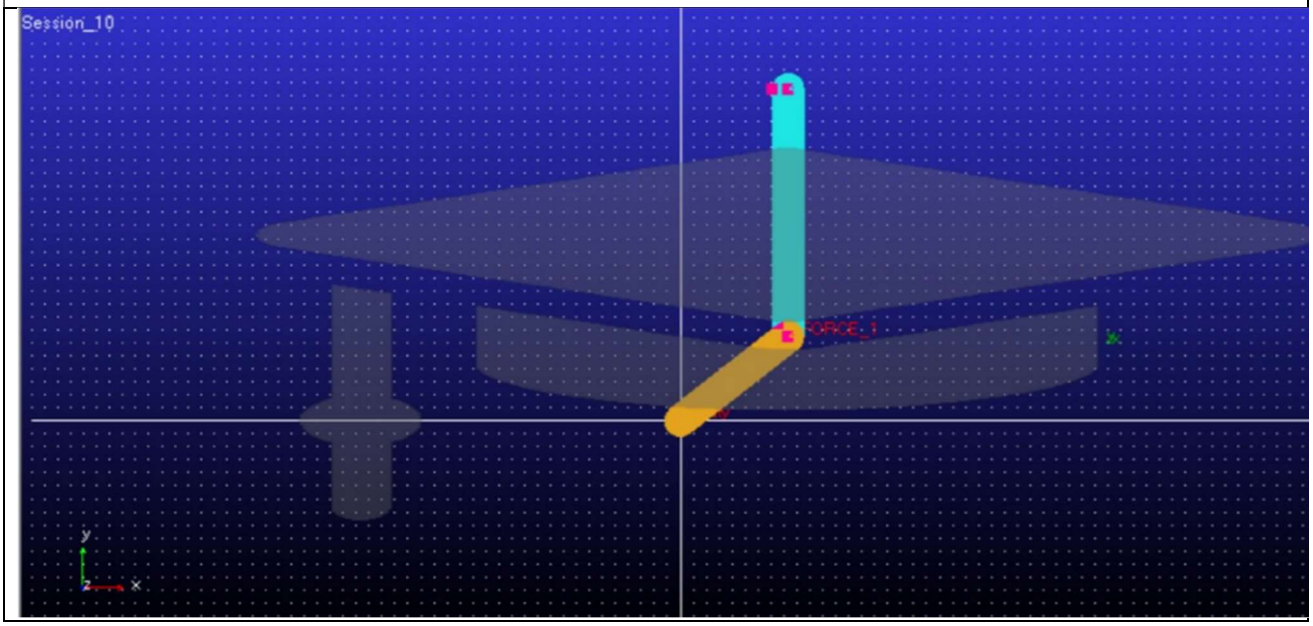
	Information for Q2					
Parameters	Separation	Box edge		Mass of Box A		Mass of Box B
Values	10 m	1 m		3 kg		3 kg
Parameters	Velocity of Box B	Coefficients of Friction				Final Separation
Values	10 m/s	A	0.3	B	0	Between 3-5 m

Question 1 (PID Controller for Two Link System)

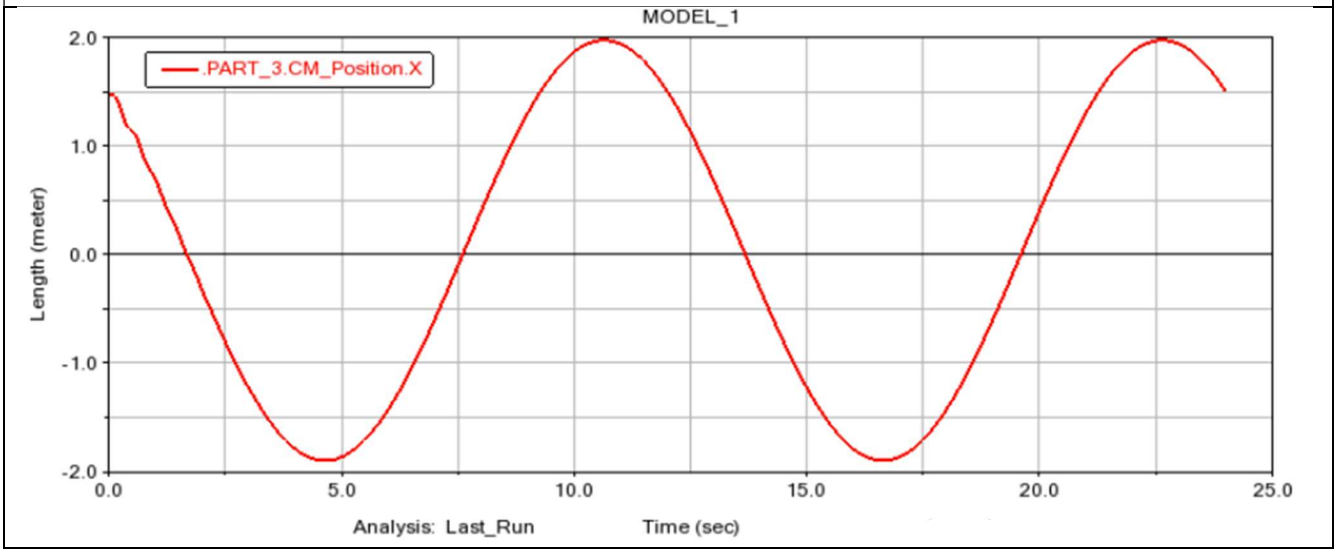
ISOMETRIC VIEW OF TWO LINK MECHANISM



FRONT VIEW OF TWO LINK MECHANISM



HORIZONTAL DISPLACEMENT OF COM OF 2ND LINK VS TIME

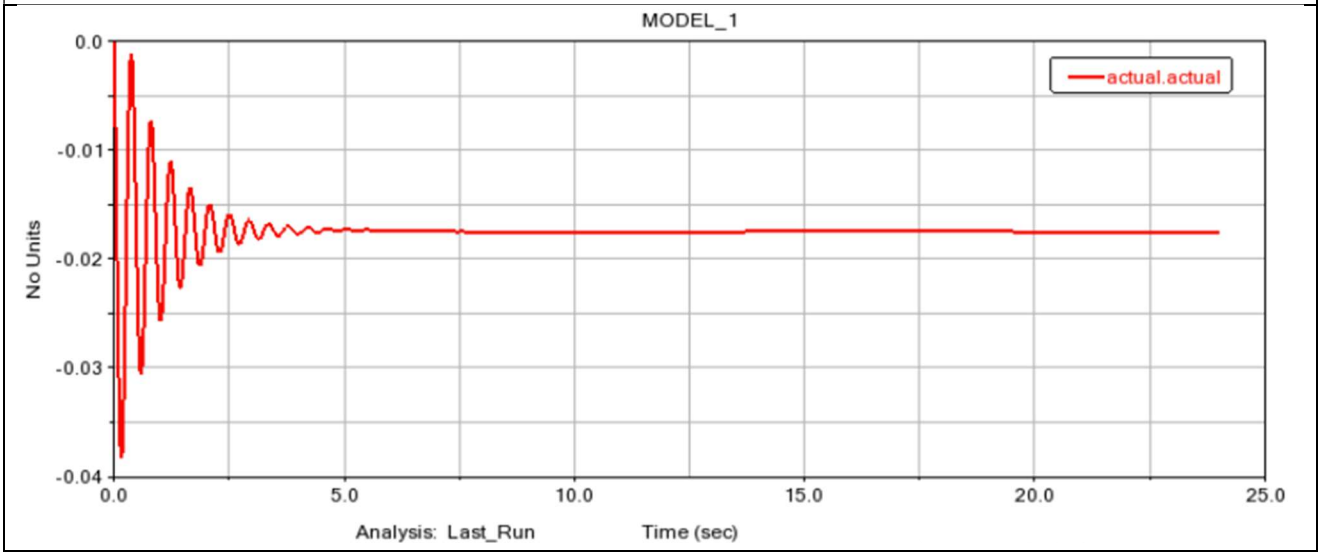


Parameters	K_p	K_d	K_i
Values	7	35000	0

OUTPUTS:

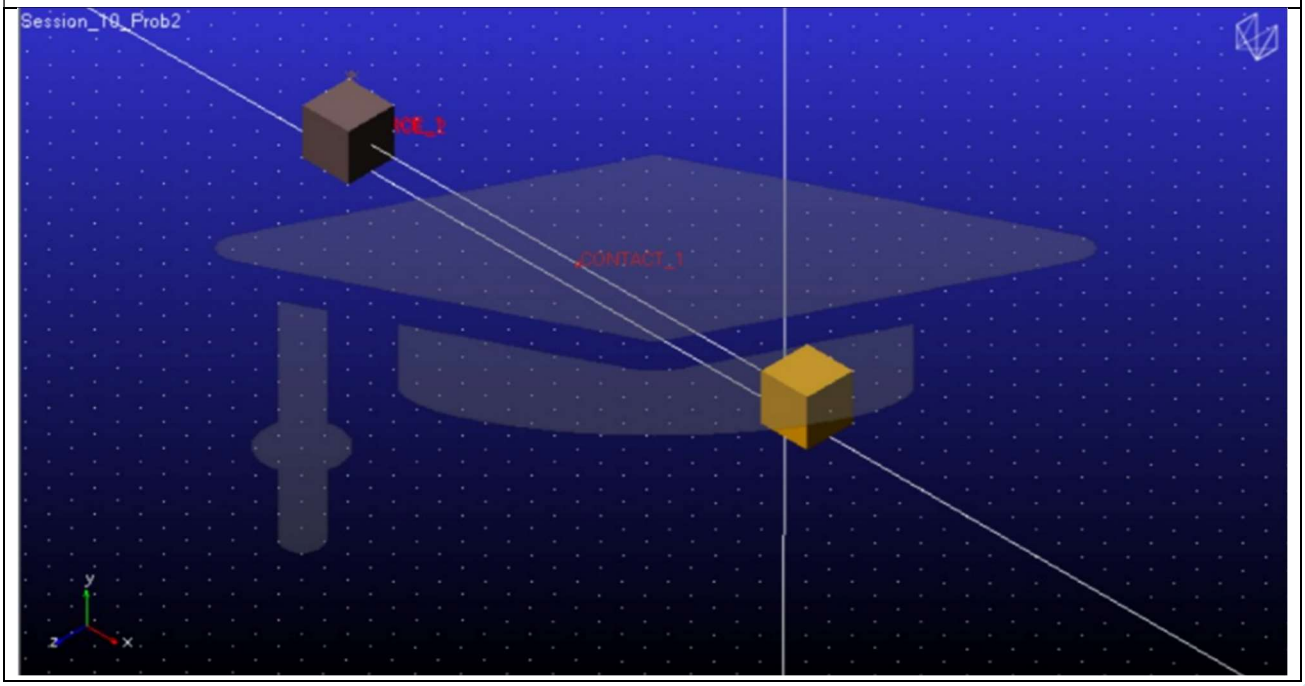
We can clearly see from the above plot that the deviation from mean (vertical) is always less than 0.0175 radians (1°).

ANGULAR DEVIATION OF LINK 2 FROM VERTICAL VS TIME

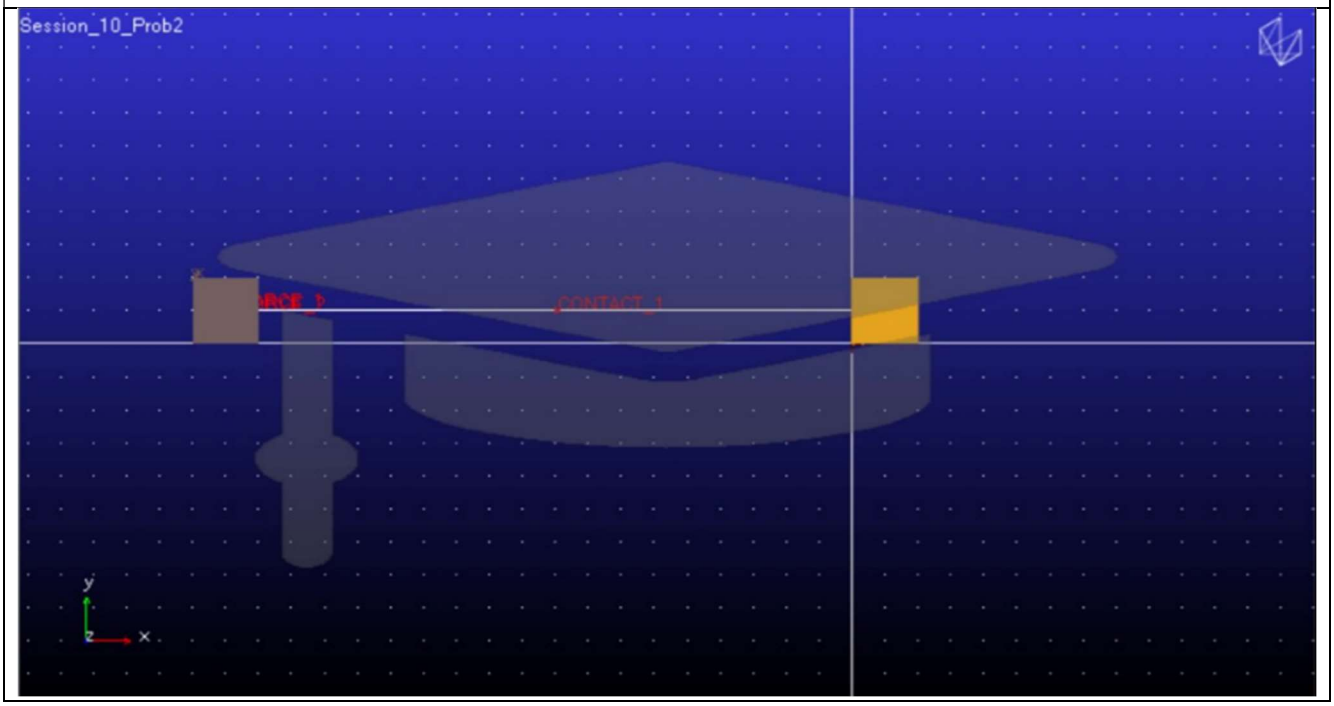


Question 2 (Two Box System)

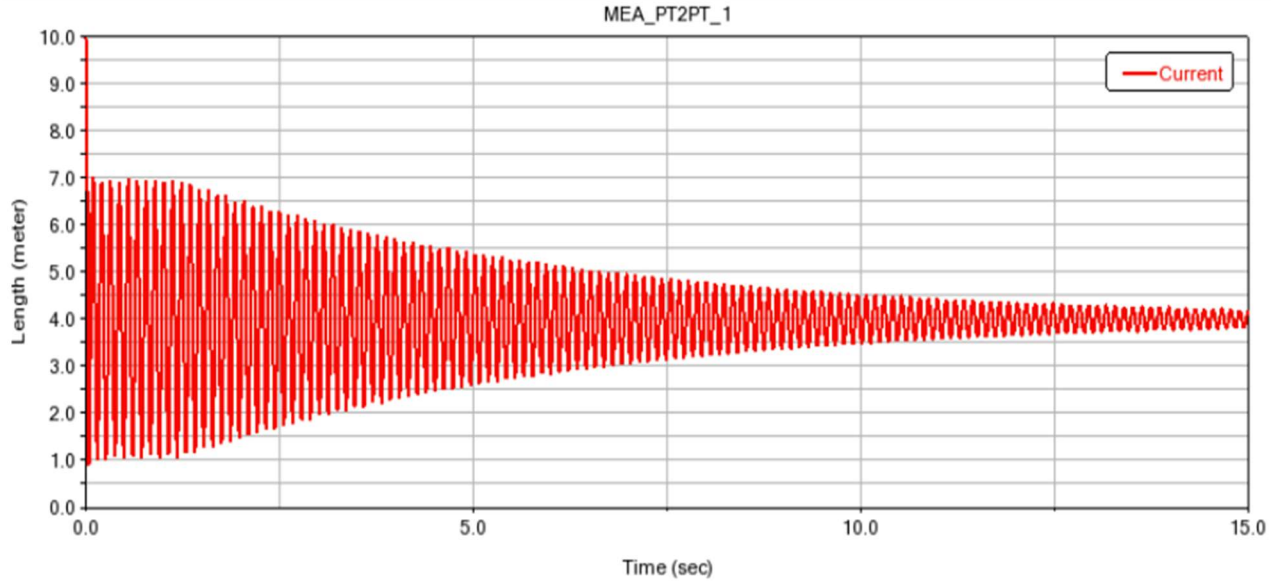
ISOMETRIC VIEW OF TWO BOX SYSTEM



FRONT VIEW OF TWO BOX SYSTEM

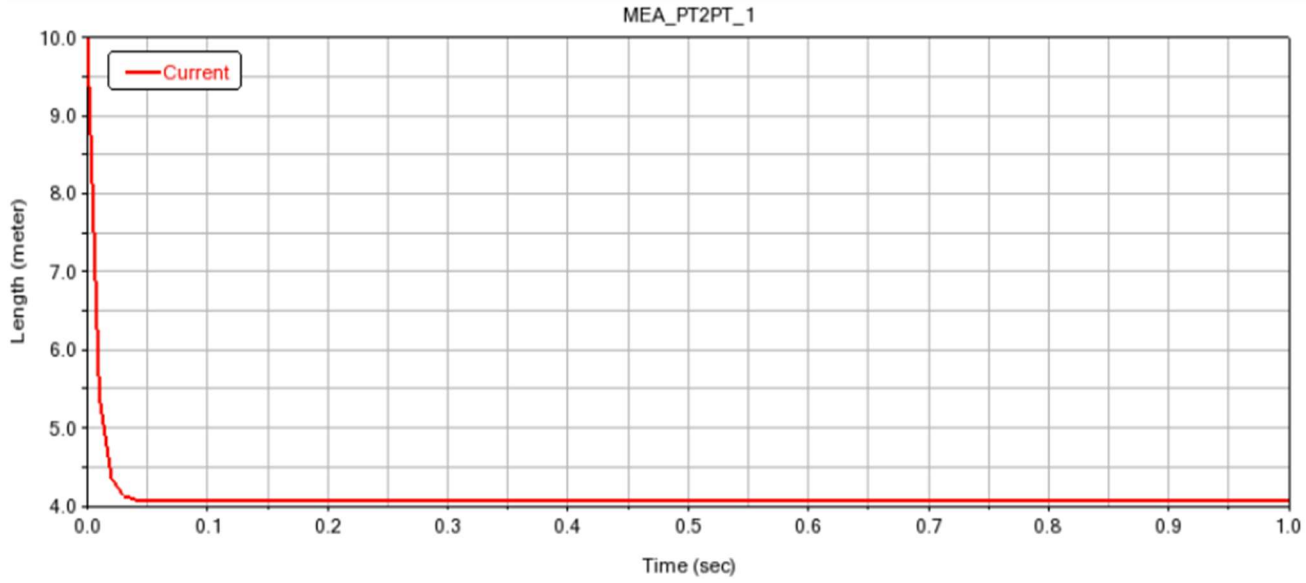


DISTANCE BETWEEN THE TWO BOXES (CONTACT FORCE IS ENABLED, FORCE IS CONTROLLED)

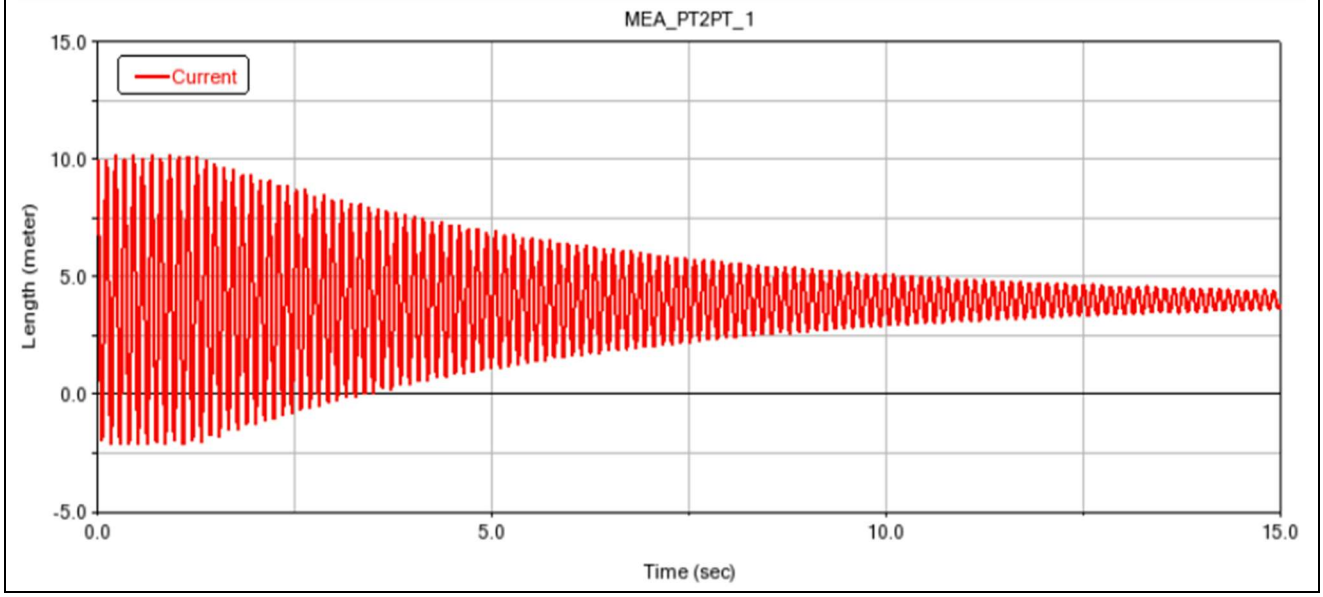


Parameters	K_p	K_d	K_i	Gain
Values	10000	8000	0	150

DISTANCE BETWEEN THE TWO BOXES (CONTACT FORCE IS ENABLED, VELOCITY IS CONTROLLED)



DISTANCE BETWEEN THE TWO BOXES (CONTACT FORCE IS DISABLED, FORCE IS CONTROLLED)



Parameters	K_p	K_d	K_i
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 K_i. 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

—X—X—X—X— X—X—X — X—**END**— X—X— X—X— X—X— X—X—