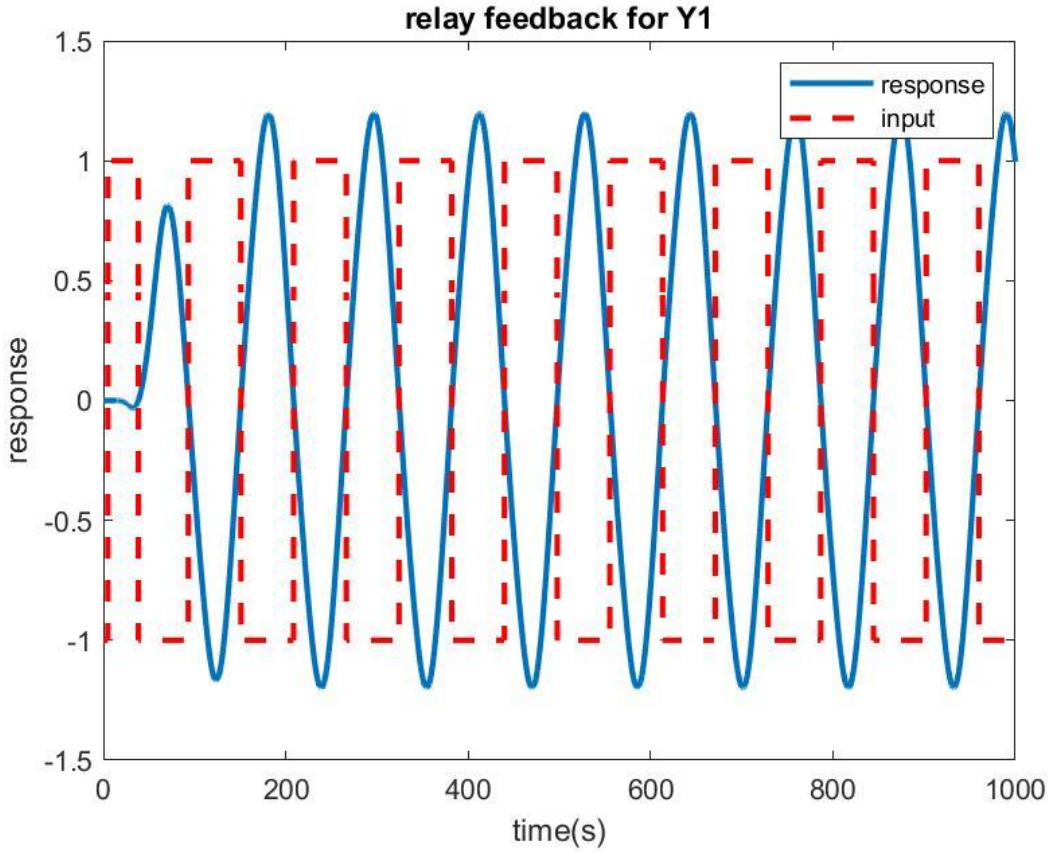
# Lab Report 6(170747)

## Part A:

**Relay Feedback Test:**

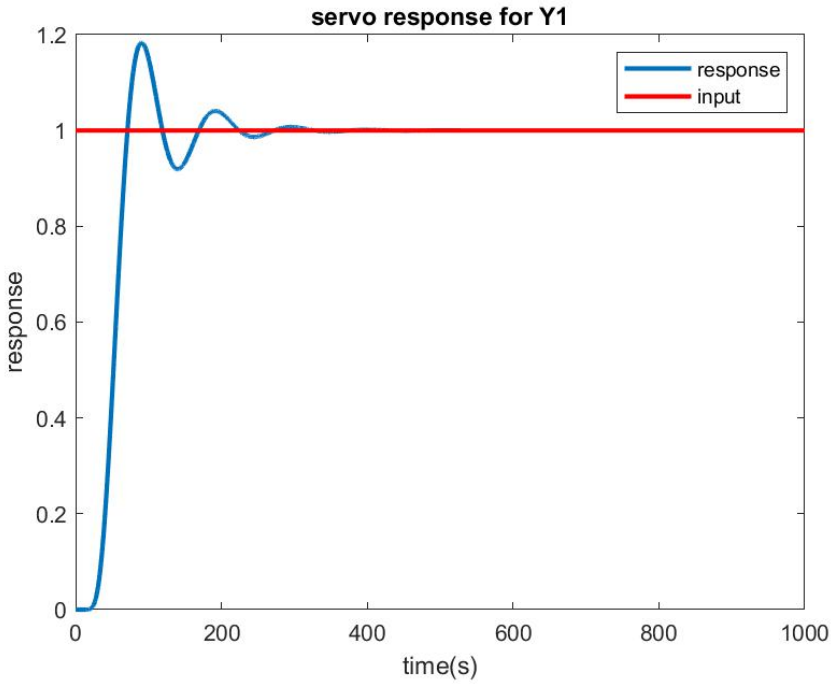
Ku = 4 h/aπ = 1.0628

Pu = 115.7 s

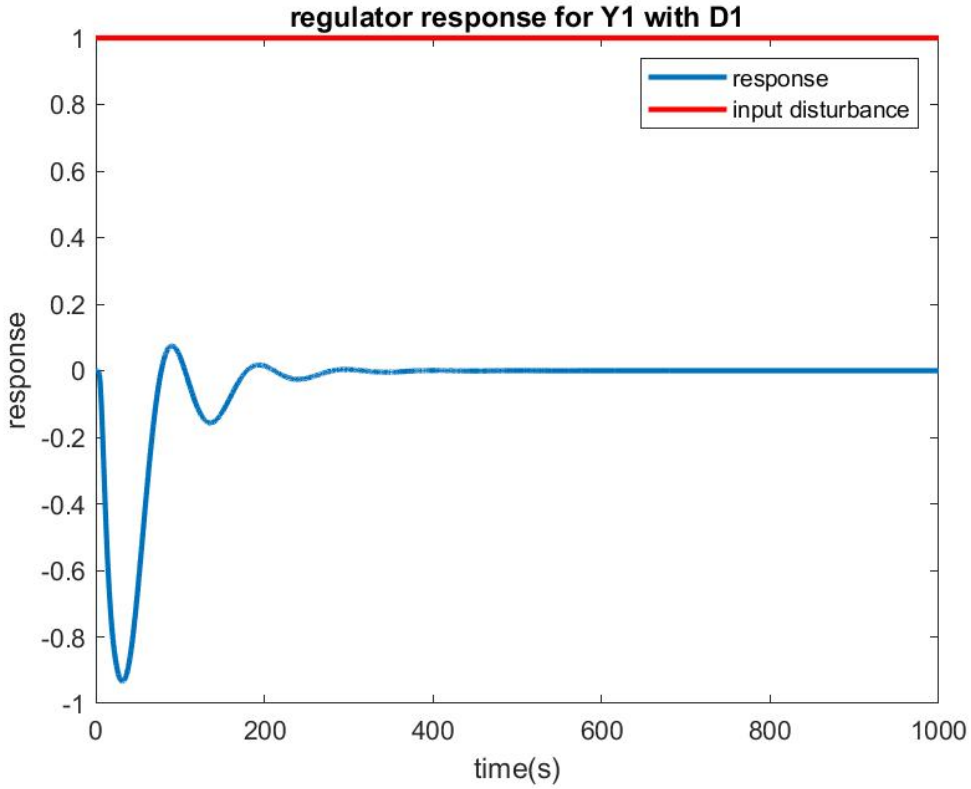


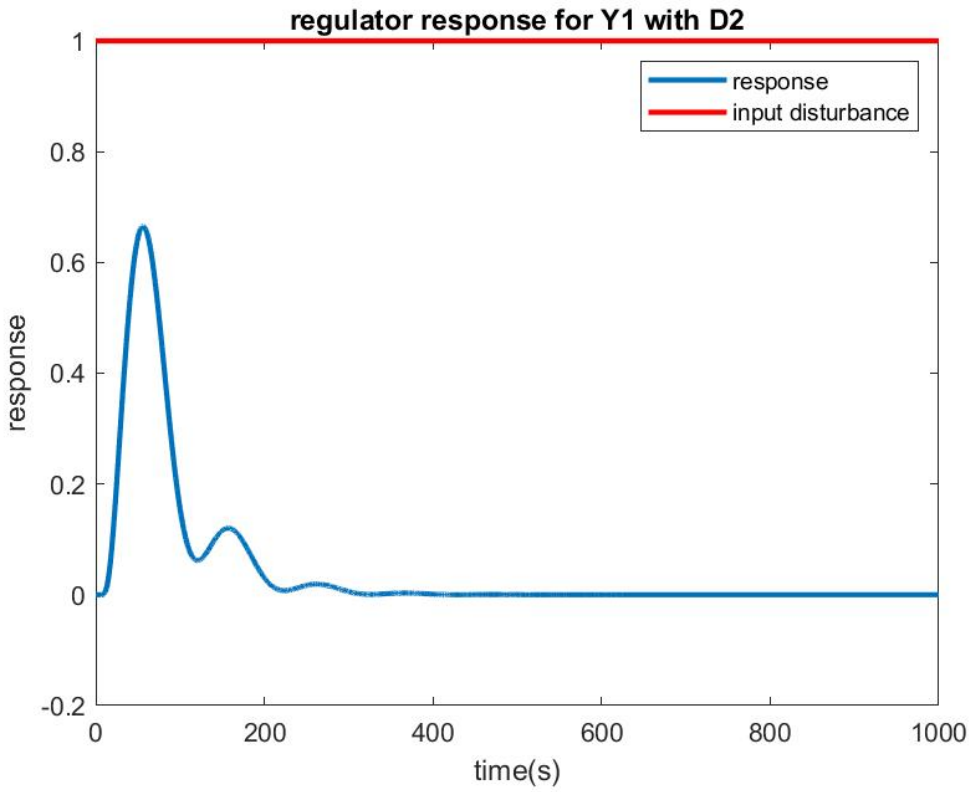

For Zeigler Nichols tuning: **Kc=Ku/1.7 = 0.625** **Ti=Pu/2 = 57.85s** **Td=Pu/8=14.462s**

## Servo Response



# Regulator Responses



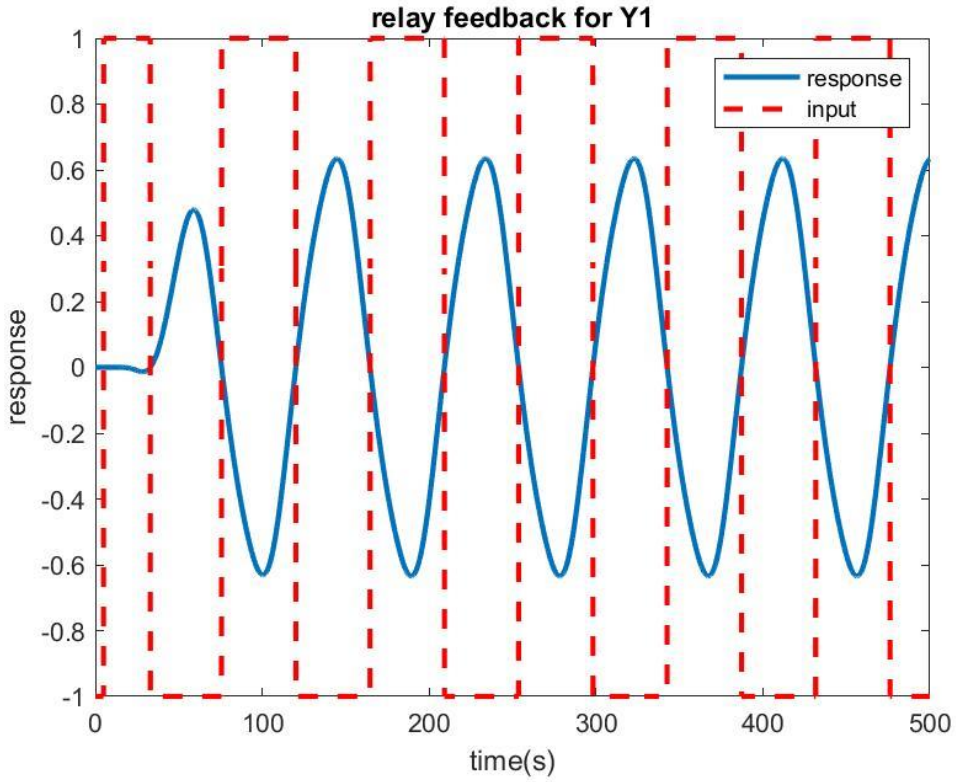
## Part: B

## Relay feedback for Y1

Ku = 4 h/aπ = 1.6804

Pu =31.9 s

For Zeigler Nichols tuning: **Kc=Ku/1.7 = 0.988** **Ti=Pu/2 = 15.95s** **Td=Pu/8=3.9875s**

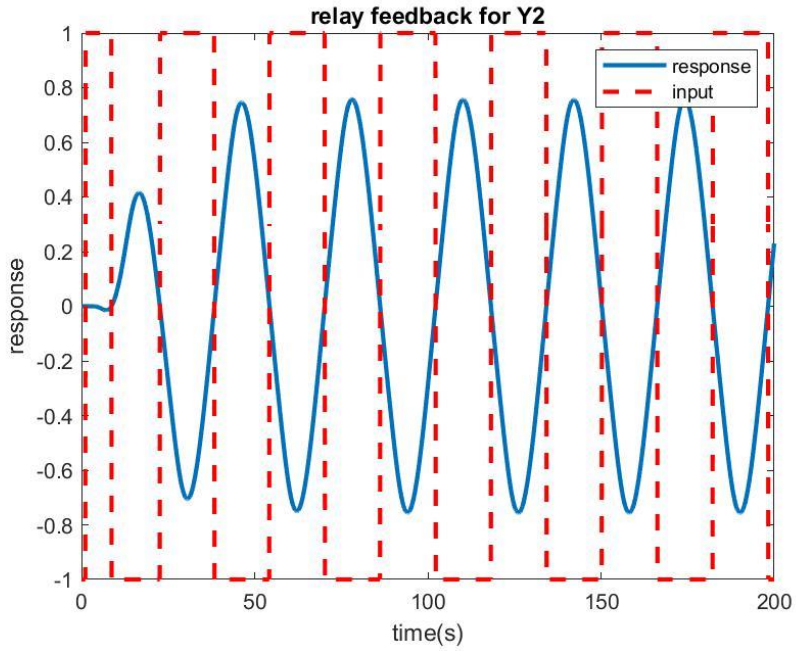



## Relay feedback for Y2

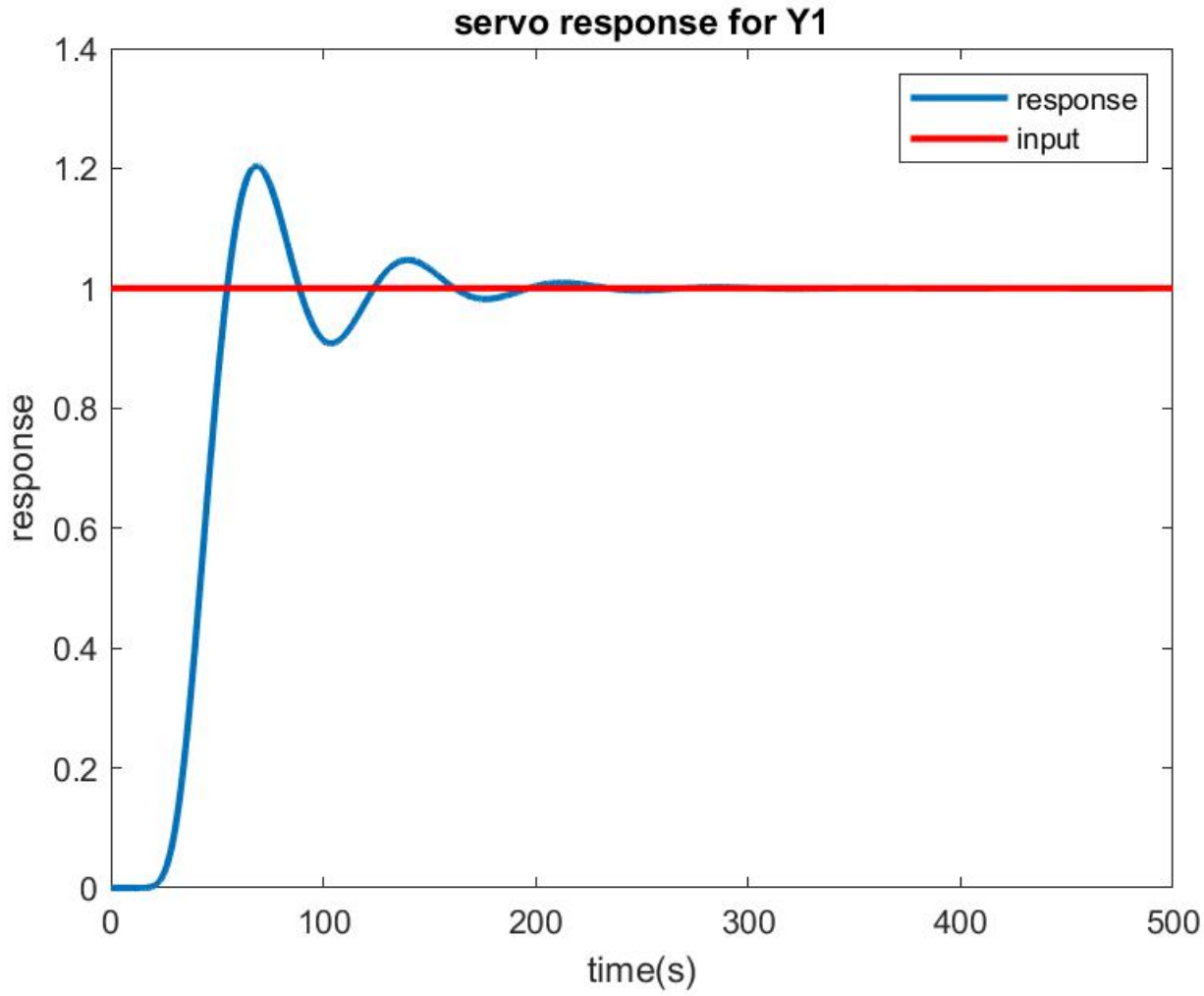
Ku = 4 h/aπ = 2.0073

Pu =89.1 s

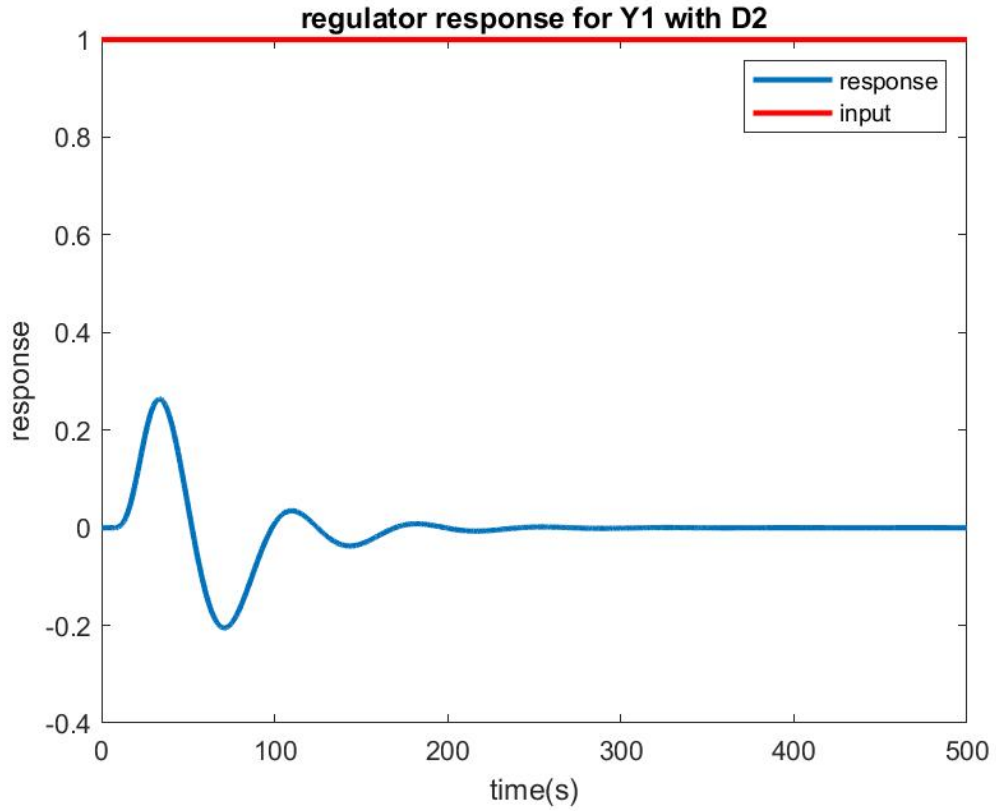
For Zeigler Nichols tuning: **Kc=Ku/1.7 = 1.18** **Ti=Pu/2 = 44.55s** **Td=Pu/8=11.13s**

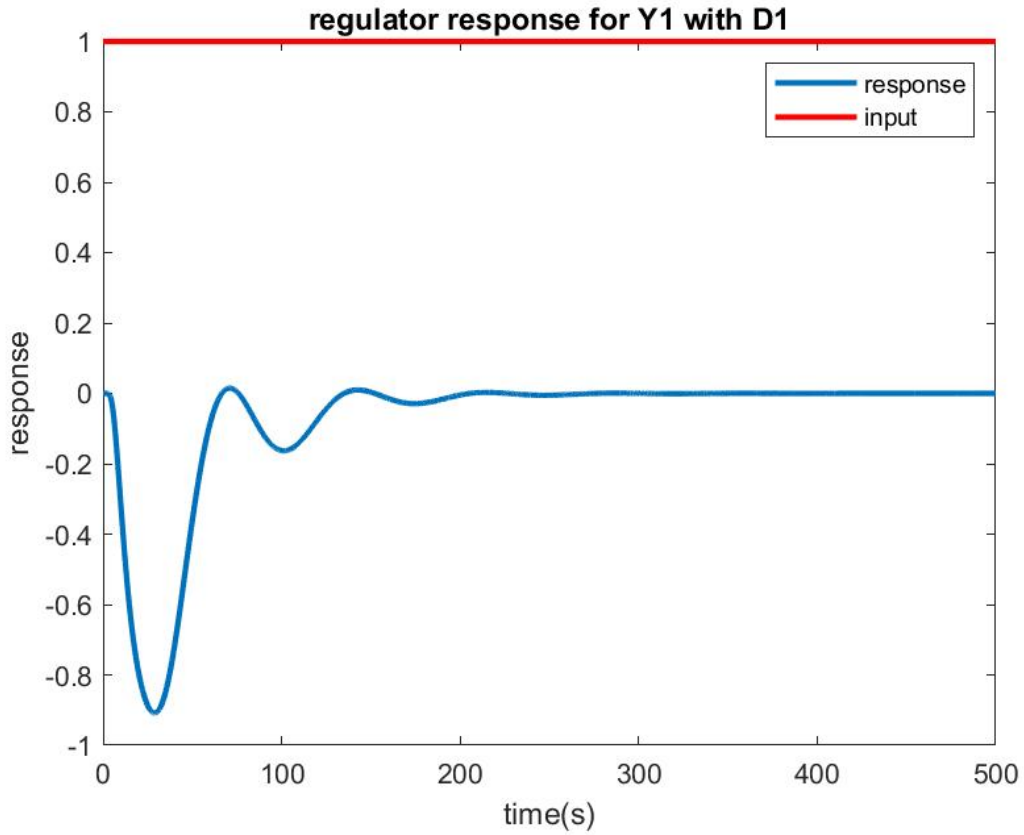


# Servo Response



# Regulator Responses

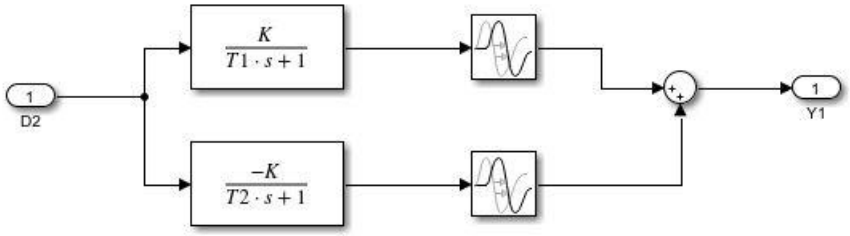


**Part: C**

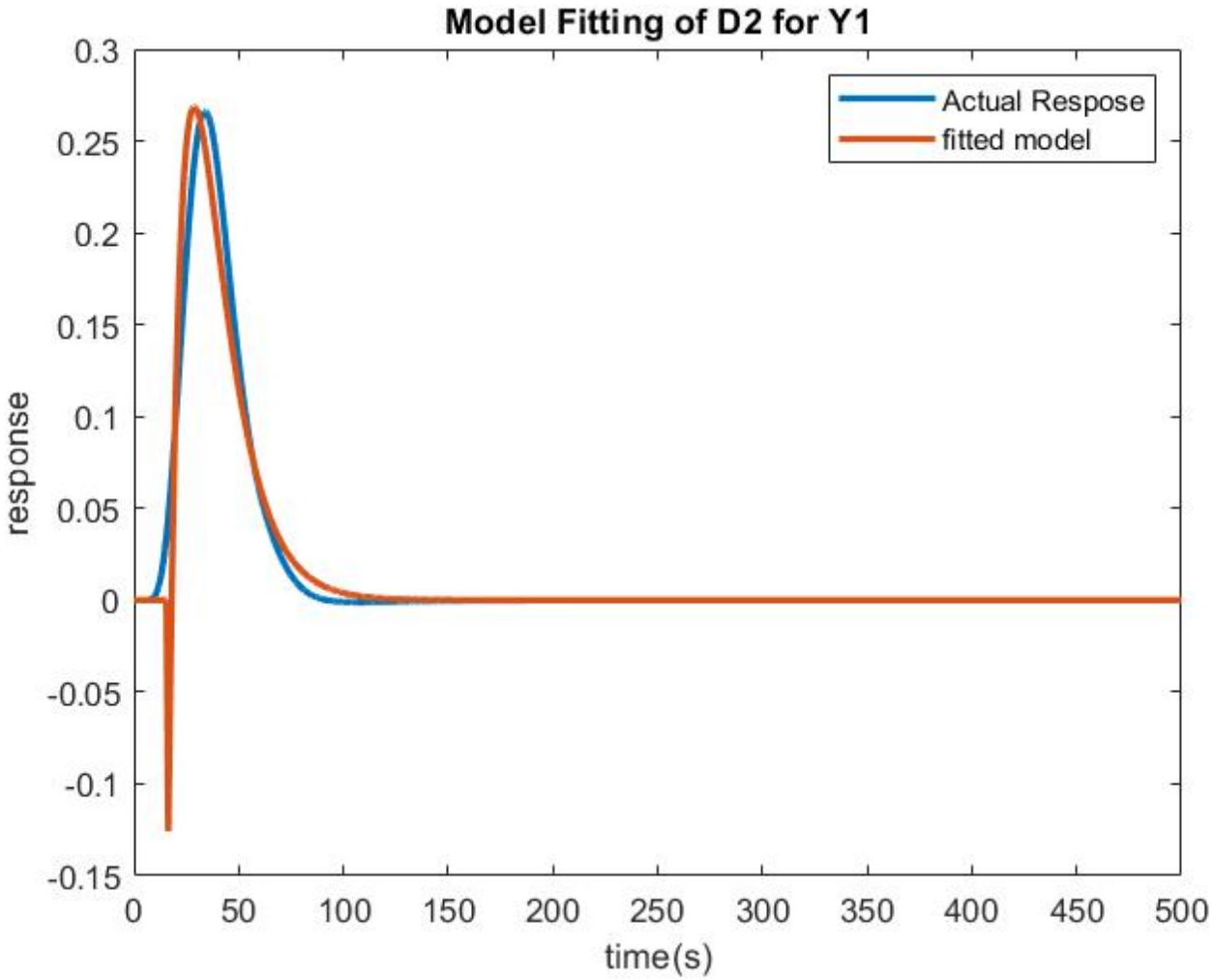
**Model fitting of D2 w.r.t Y1**

The following model was fitted using fmincon in which IAE was minimized

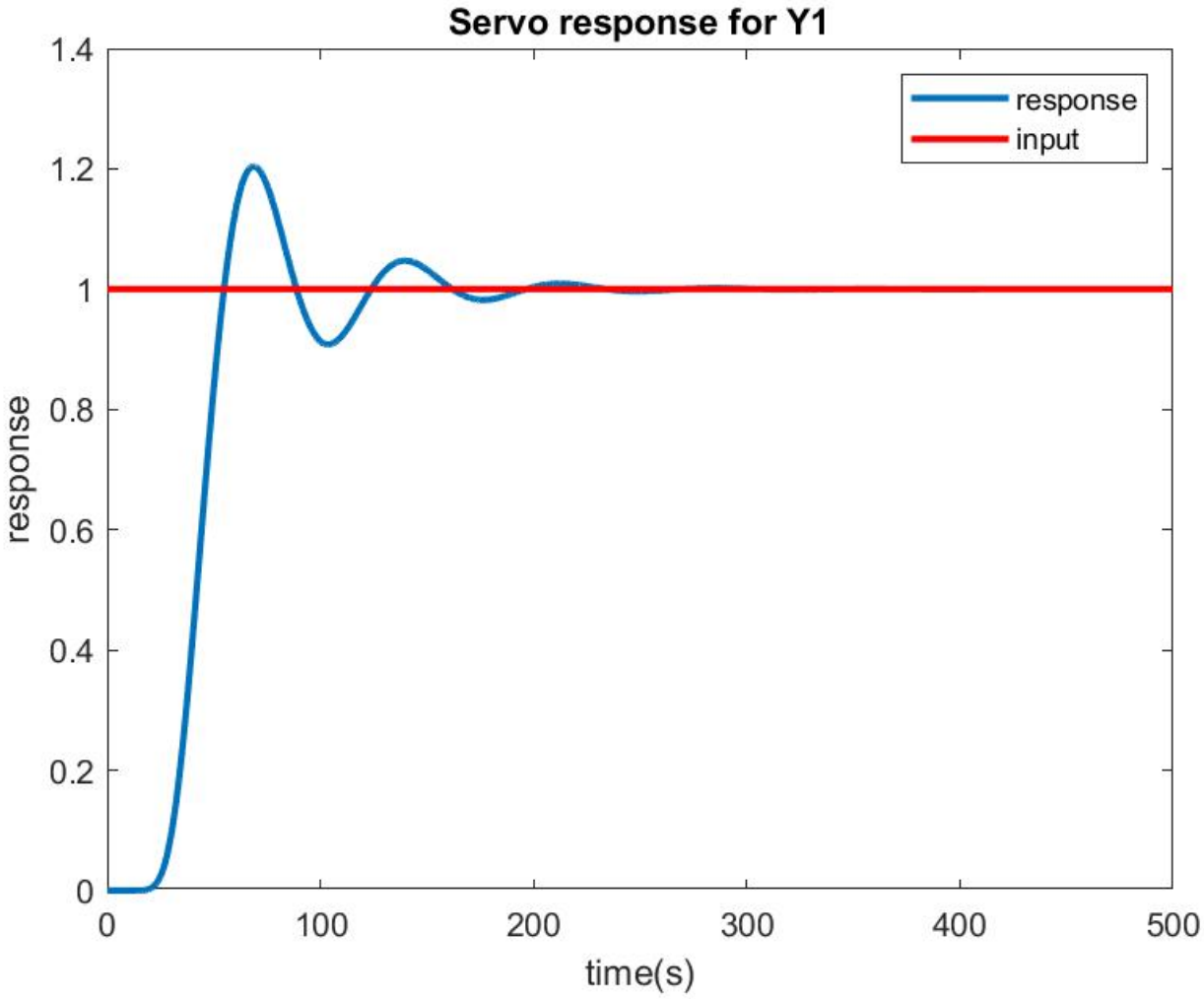



**IAE values: -**

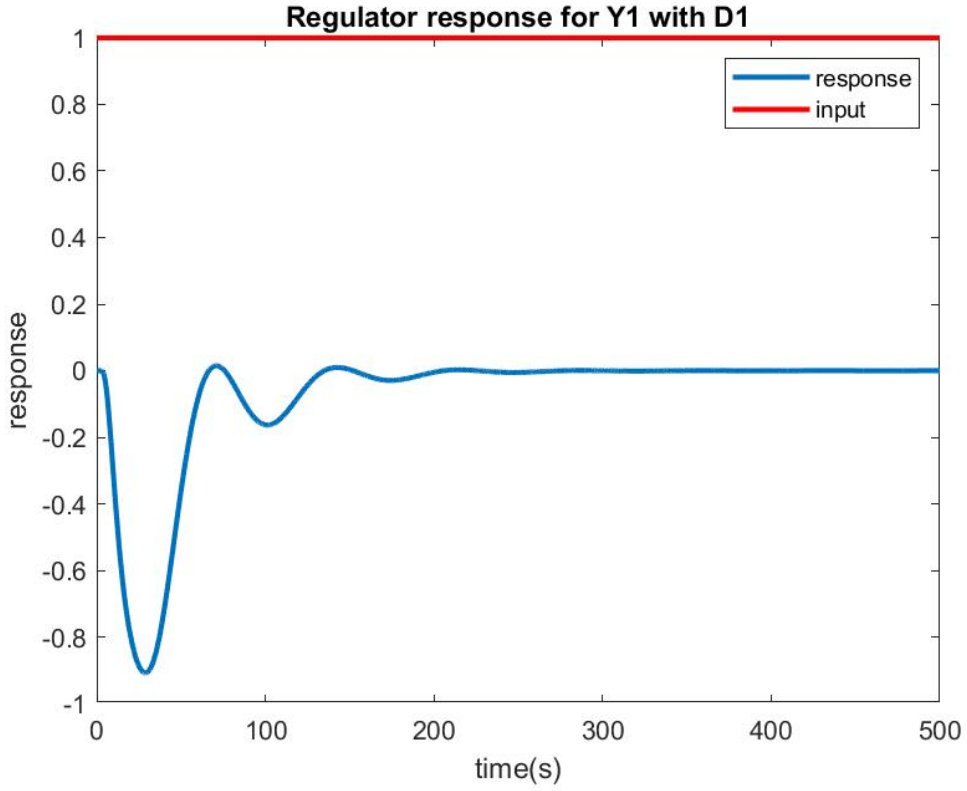
**X= [1.9487 8.6803 13.6714 16.4093 15.4875] (K,T1,T2,D1,D2)**

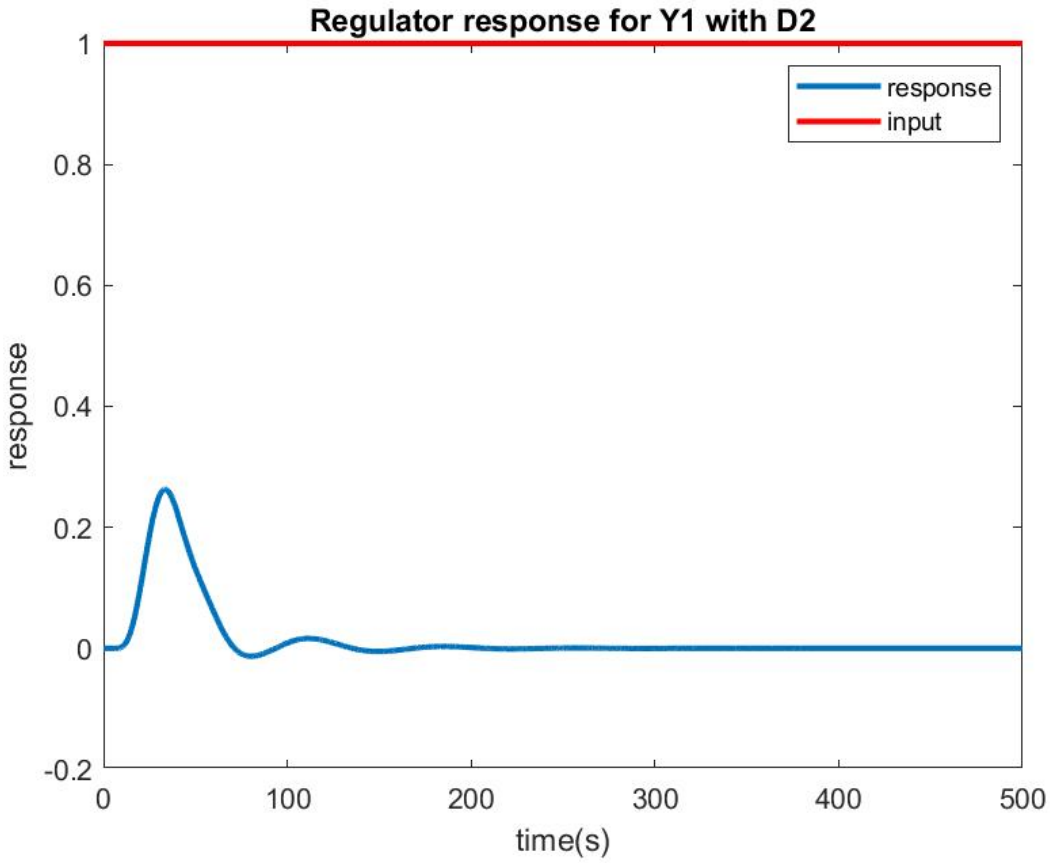


# Servo Response

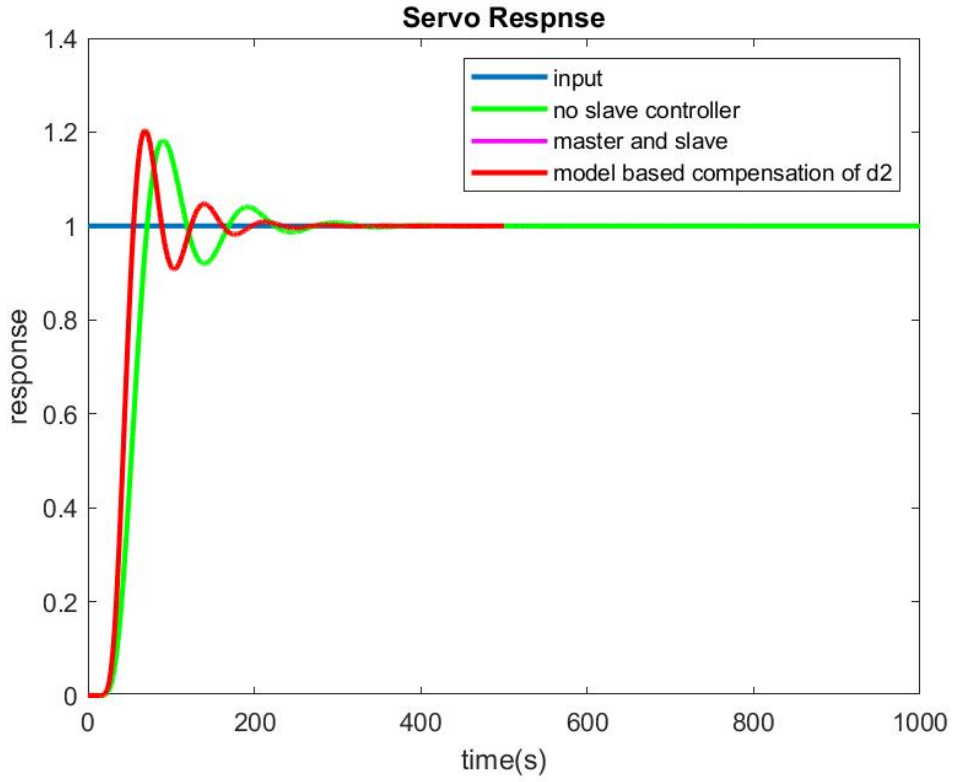


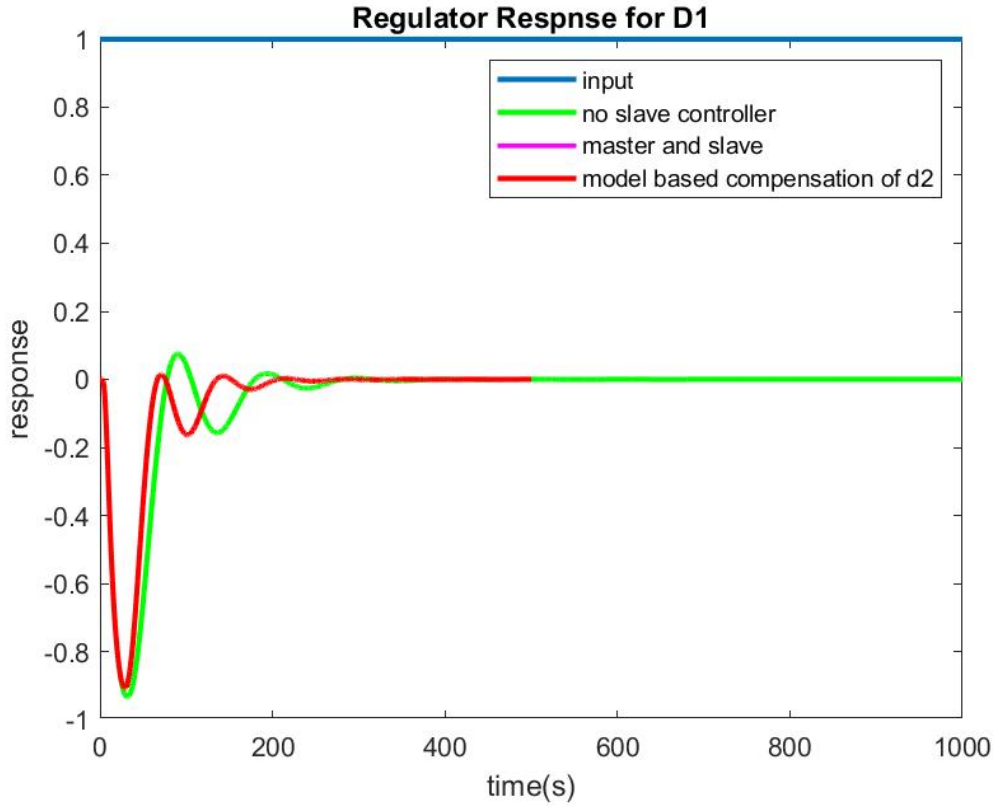
# Regulator Responses



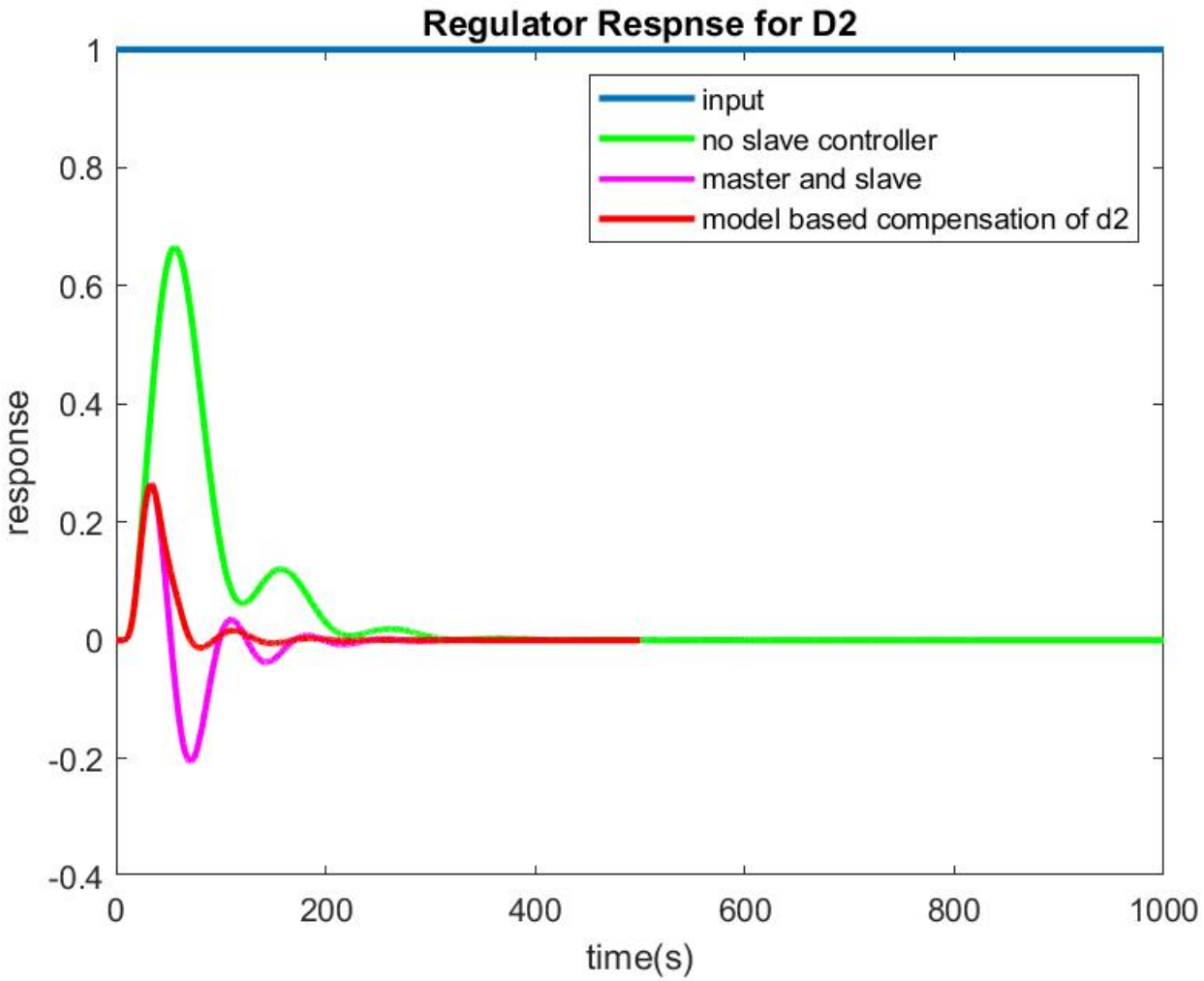



## Comparisons of Servo and Regulator responses




Servo and regulator response for D1 overlap each other for part b and c but provide a better control as compared with part a




We can see that the model based compensation provides the best control among all as it eliminates the change caused by D2 in Y1