**Ball and Beam Experiment Report**

**Experiment Result**

1. **Calibration**

**(1)position**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Position | -30 | -10 | 0 | 10 | 30 |
| Voltage | 5.995 | 5.042 | 4.561 | 4.081 | 3.121 |
| a=20.87 b=95.168 | | | | | | |

**(2)Angle**



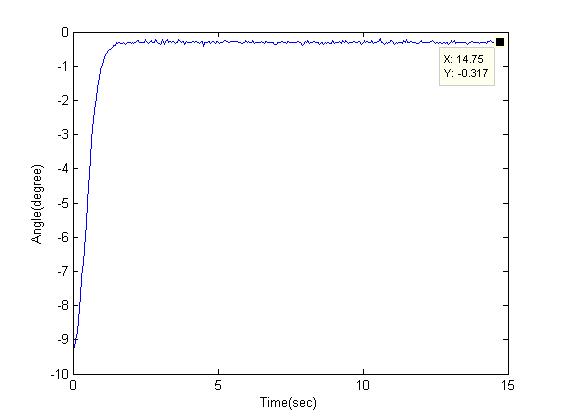
 

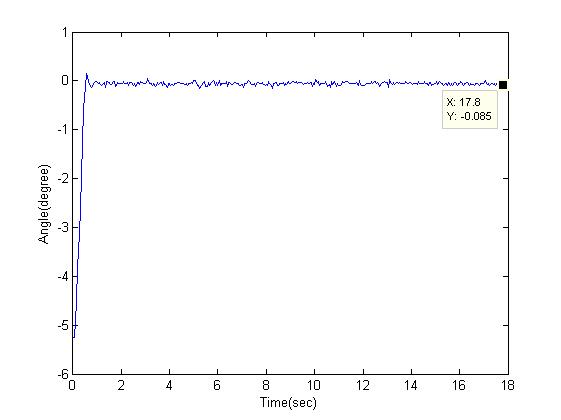
**2. Beam Angle Control**

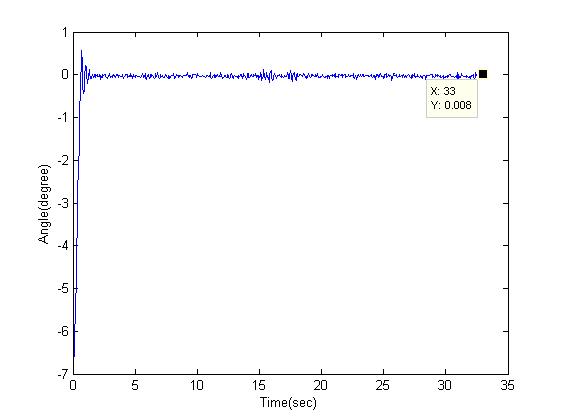
(1) Desired angle is 0. Please Record the Steady-error and the data in different 

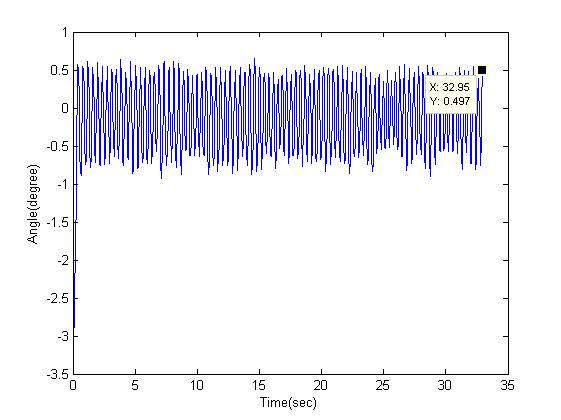
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 3 | 5 | 7 | 15 | 20 |
| Steady-error | 0.317 | 0.085 | 0.008 | 0.497 | 0.694 | 0.776 |

(2)Data Plot

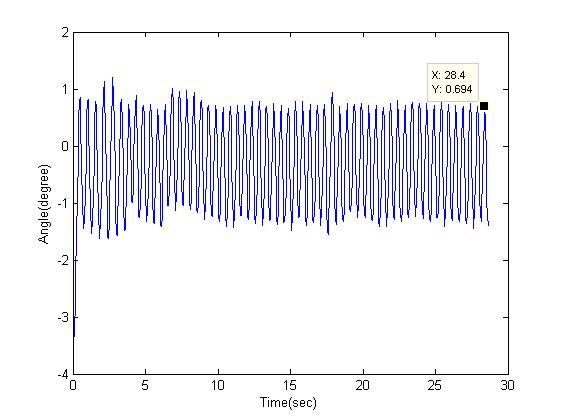


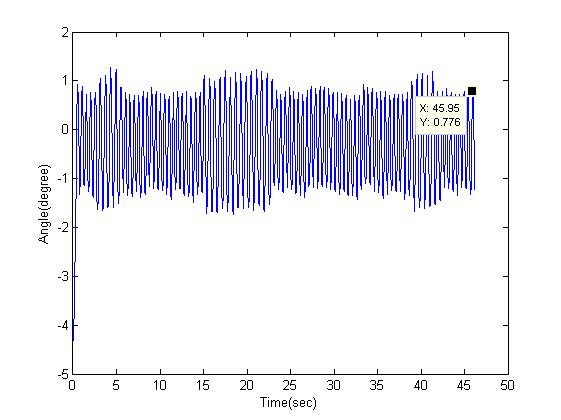






5





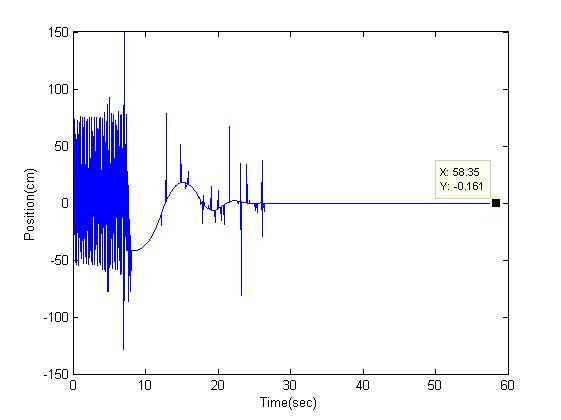
**3. BALL AND BEAM EXPERIMENT - PART I**

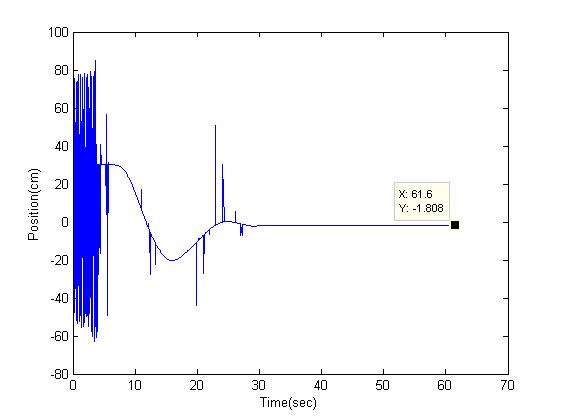
(1) Find the parameter  of the control ,with different damping ratio  and natural frequency 

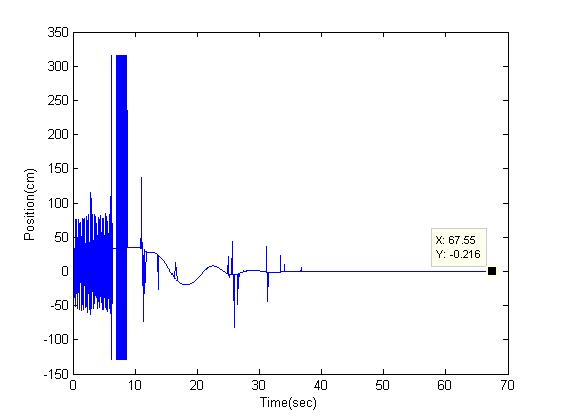
|  |  |  |
| --- | --- | --- |
|  |  |  |
|  | 0.918 | 0.612 |
|  | 0.102 | 0.144 |
|  | 0.918 | 0.433 |
|  | 0.102 | 0.102 |
|  | 0.918 | 0.306 |

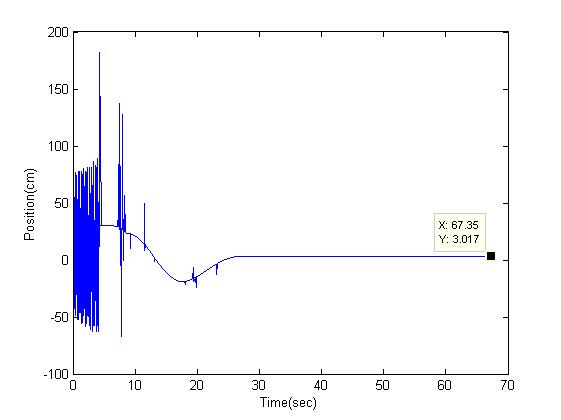


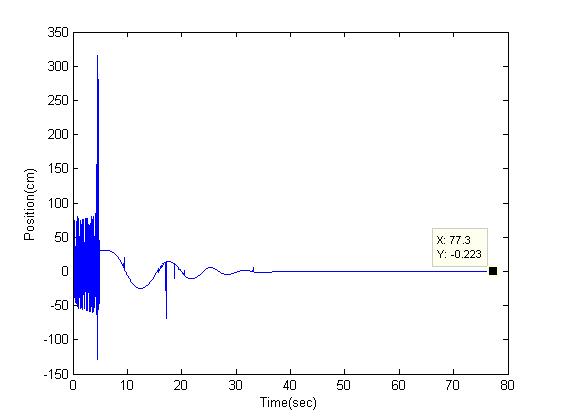
(2) Desired position is 0 cm. Set up all the parameter and plot the performance data.











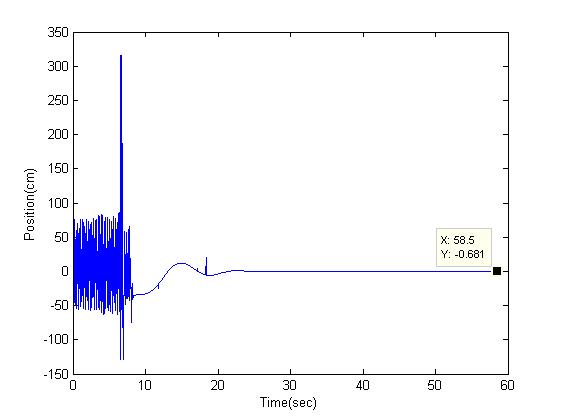
**4. BALL AND BEAM EXPERIMENT - PART II**

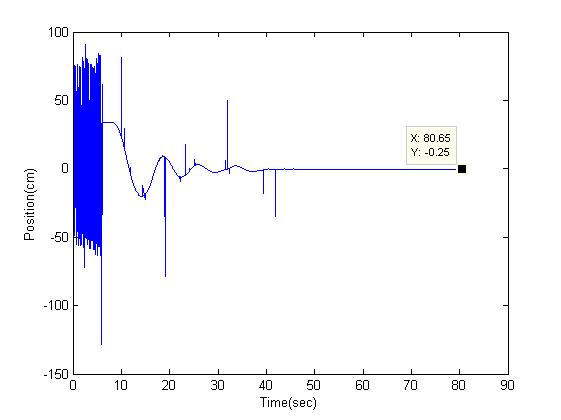
(1) Find the parameter  of the control ,with different damping ratio  and natural frequency , decay rate 

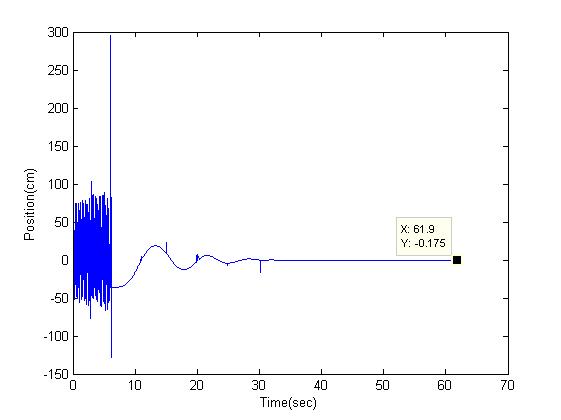
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
| 1 | 3 | 10 | 0.574 | 16 | 0.440 |
| 0.707 | 3 | 10 | 0.6448 | 14.242 | 0.368 |
| 0.707 | 3 | 20 | 0.7577 | 24.242 | 0.395 |
| 0.5 | 3 | 20 | 0.7986 | 23 | 0.306 |

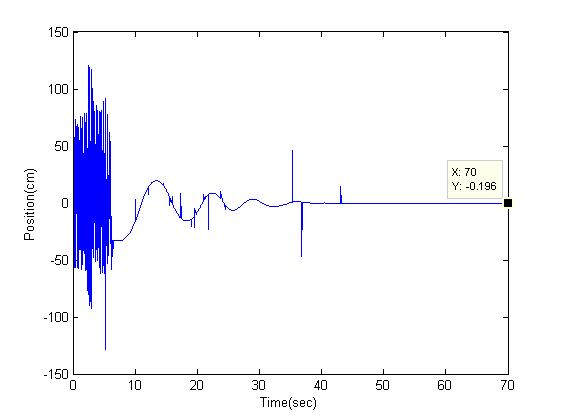


(2) Desired position is 0 cm. Set up all the parameter and plot the performance data.



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