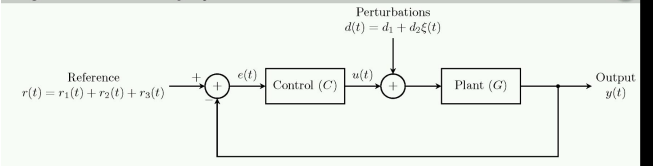
Control Toolbox: PID Controller

Diagram: Closed loop system with PID controller



$C(s) = \frac{U(s)}{E(s)} = K_P + \frac{K_I}{s} + K_D s$

$C(z) = \frac{U(z)}{E(z)} = K_P + K_I \frac{T_S(z+1)}{2(z-1)} + K_D \frac{z-1}{T_S z}$

T_S is sampling time and $\xi(t)$ is white noise with zero mean power 1.

Sampling time in milliseconds

Sampling time 100

Parameters

Controller parameters

K_P (Recommended to use values in the rage [0.0, 100.0]) : 1.0

K_I (Recommended to use values in the rage [0.0, 10.0]) : 10.0

K_D (Recommended to use values in the rage [0.0, 1.0]) : 0.0

Other parameters

Constant perturbation (d_1) (Recommended to use values in the rage [-1.0, 1.0]) : 0.0

Noise constant (d_2) (Recommended to use values in the rage [0.0, 1.0]) : 0.0

Signal generator: r1(t)=1.0sgn[sin(2π0.1t)]+2.5

Square wave

Frequency: .1 | Amplitude: 1 | Start at: 0.0 | Duty cycle: 50.0 | Offset: 2.5

Signal generator: r2(t)=0.0[2H(t)-1]

Step function

Frequency: 0.25 | Amplitude: 0.0 | Start at: 0.0 | Duty cycle: 50.0 | Offset: 0.0

Signal generator: r3(t)=0.0[2H(t)-1]

Step function

Frequency: 0.25 | Amplitude: 0.0 | Start at: 0.0 | Duty cycle: 50.0 | Offset: 0.0

Figure 1: Reference r(t) and Output y(t)

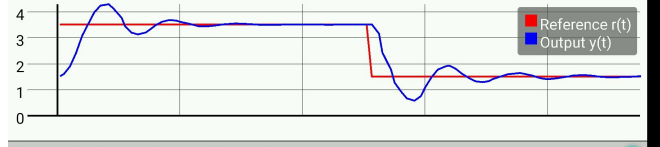
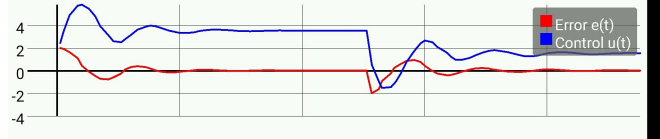


Figure 2: Error e(t) and Control u(t)



Instantaneous values

Time: 9.511
Actual sampling time: 0.09999999999999964
Reference r(t): 1.5
Output y(t): 1.513671875
Error e(t): -0.013671875
Control u(t): 1.5158056640624897

Version: 1.0.0