

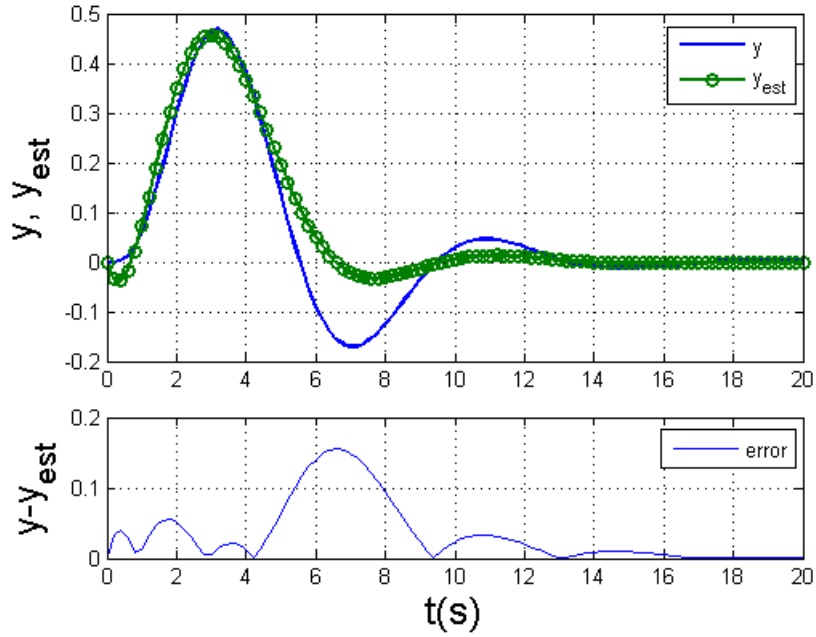
Problem statement:

Estimate the parameter of $G(s) = \frac{0.5}{s^2+s+1}$ using input function $u = 2 e^{-0.4t} \sin(0.8t)$ using Batch Least Square method

solution

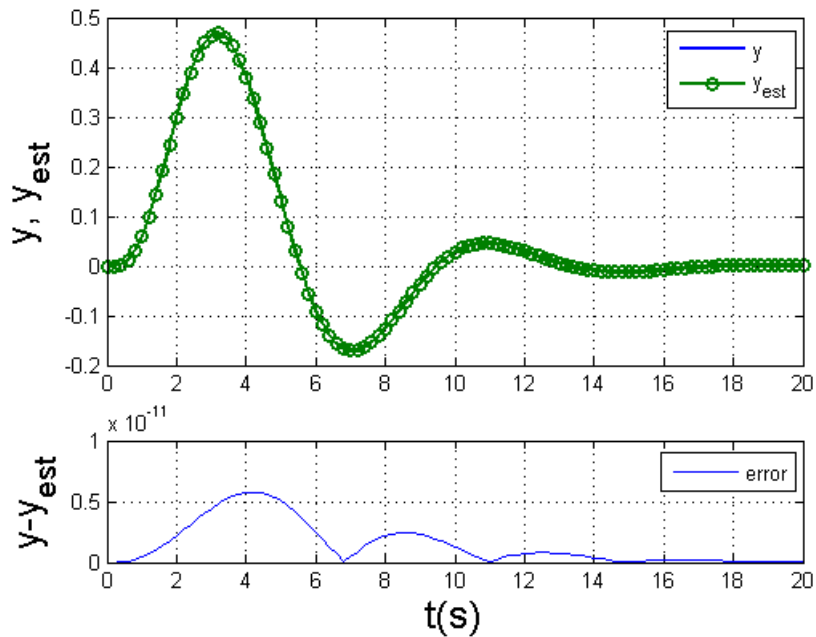
$$G(z) = \frac{0.009335z + 0.008732}{z^2 - 1.783z + 0.8187} ; T = 0.2$$

For 1st order estimation:



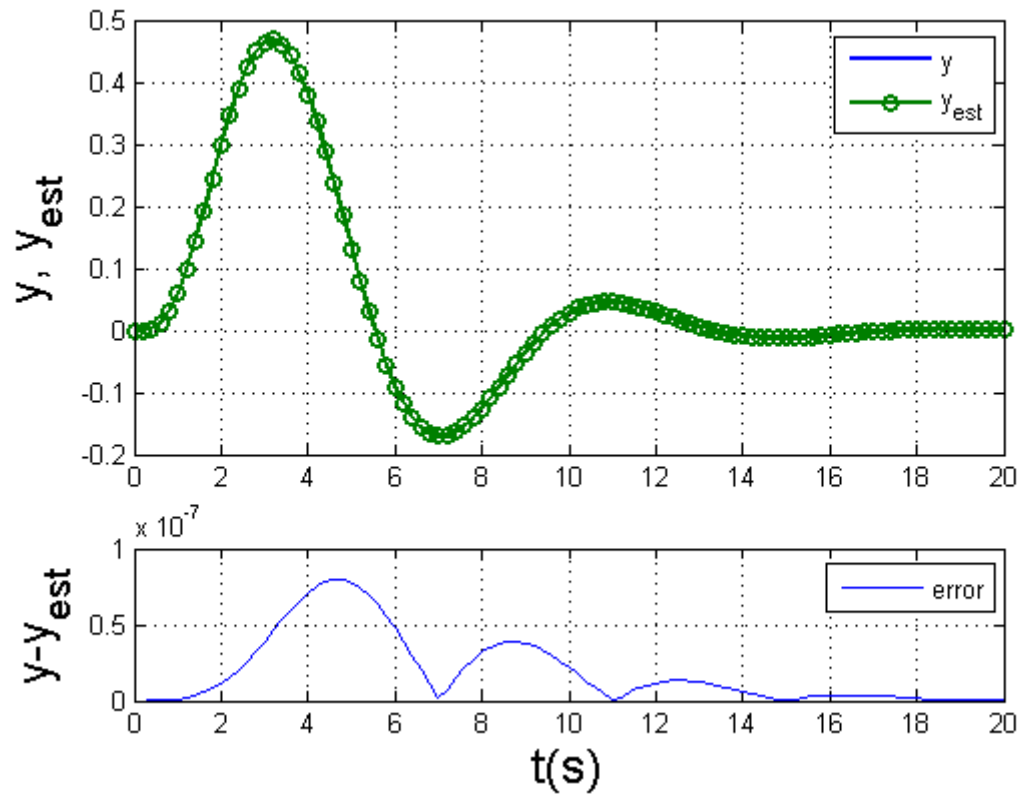
$$G(z) = \frac{-0.115z + 0.1884}{z - 0.8993}$$

For 2nd order estimation:



$$G(z) = \frac{0.009335z + 0.008732}{z^2 - 1.783z + 0.8187}$$

For 3rd order estimation:



$$G(z) = \frac{0.009335z + 0.008732}{z^3 - 1.783z^2 + 0.8187z + 3.126e - 09}$$