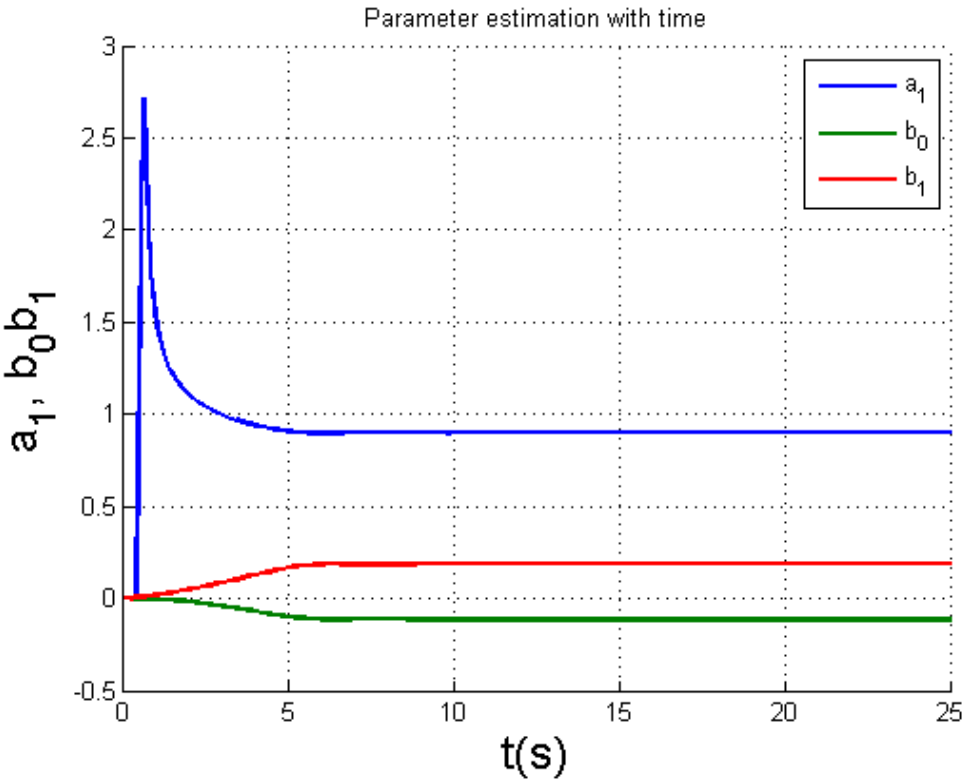
Problem statement:

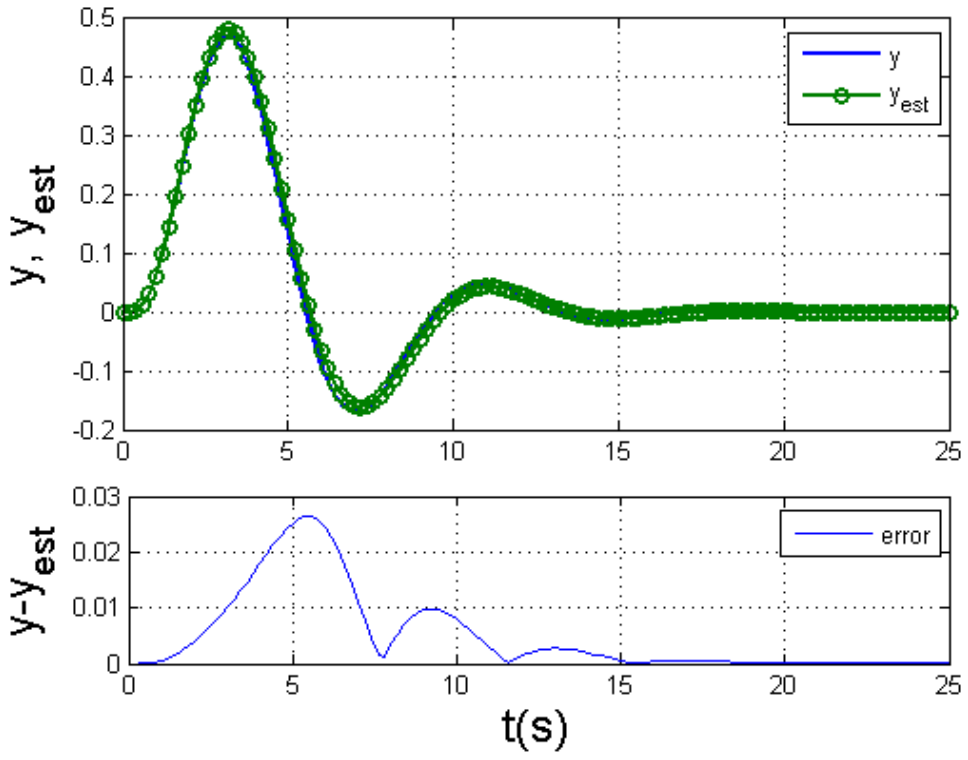
Estimate the parameter of $G(s) = \frac{0.5}{s^2+s+1}$ using input function $u = 2\ e^{-0.4t}\ sin(0.8t)$ using Recursive Least Square

solution

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

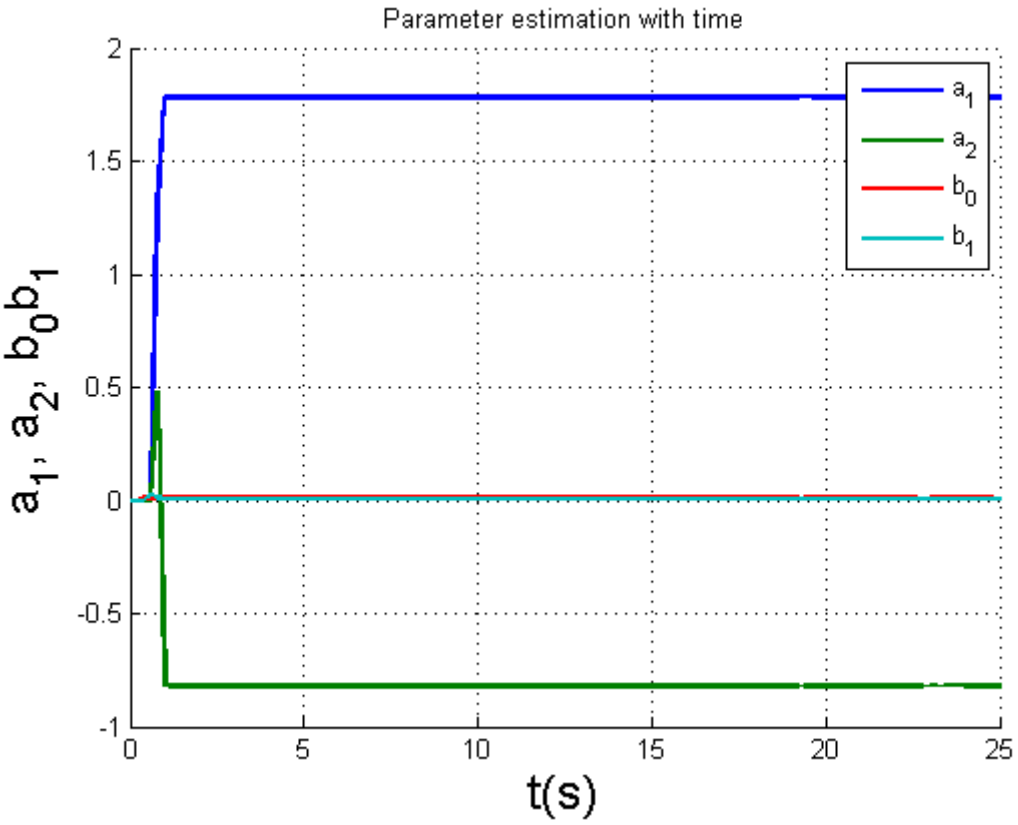
For 1^{st} order estimation:

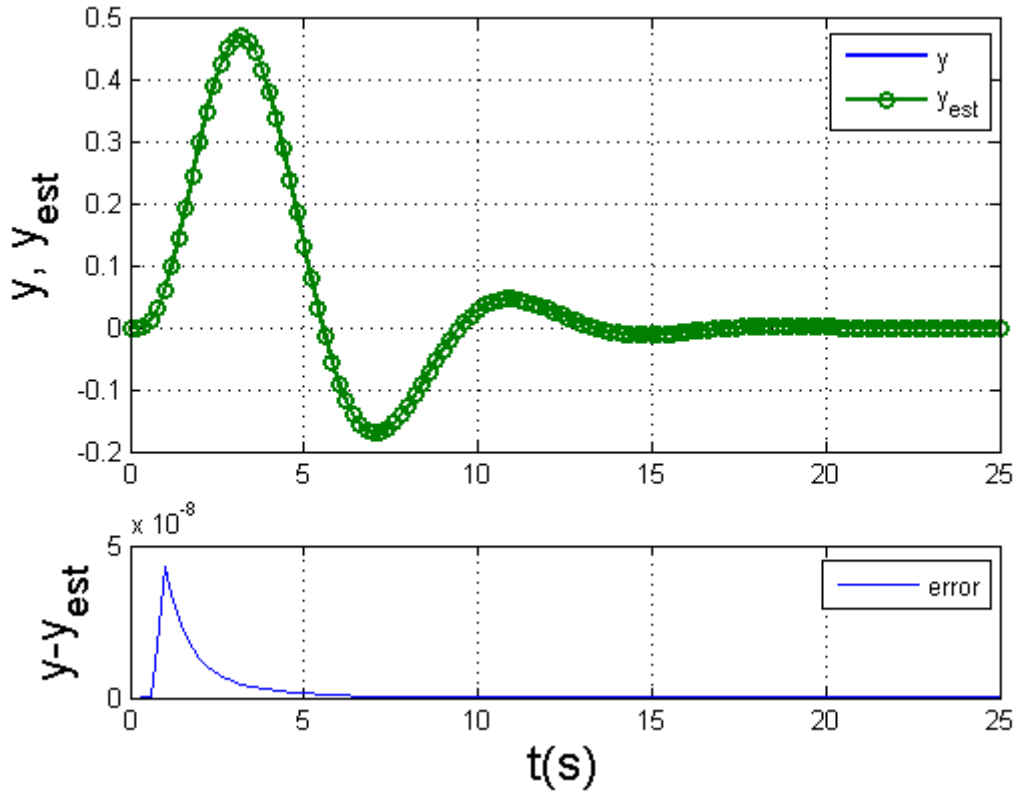




$$G(z) = \frac{-0.115z + 0.1884}{z - 0.8993}$$

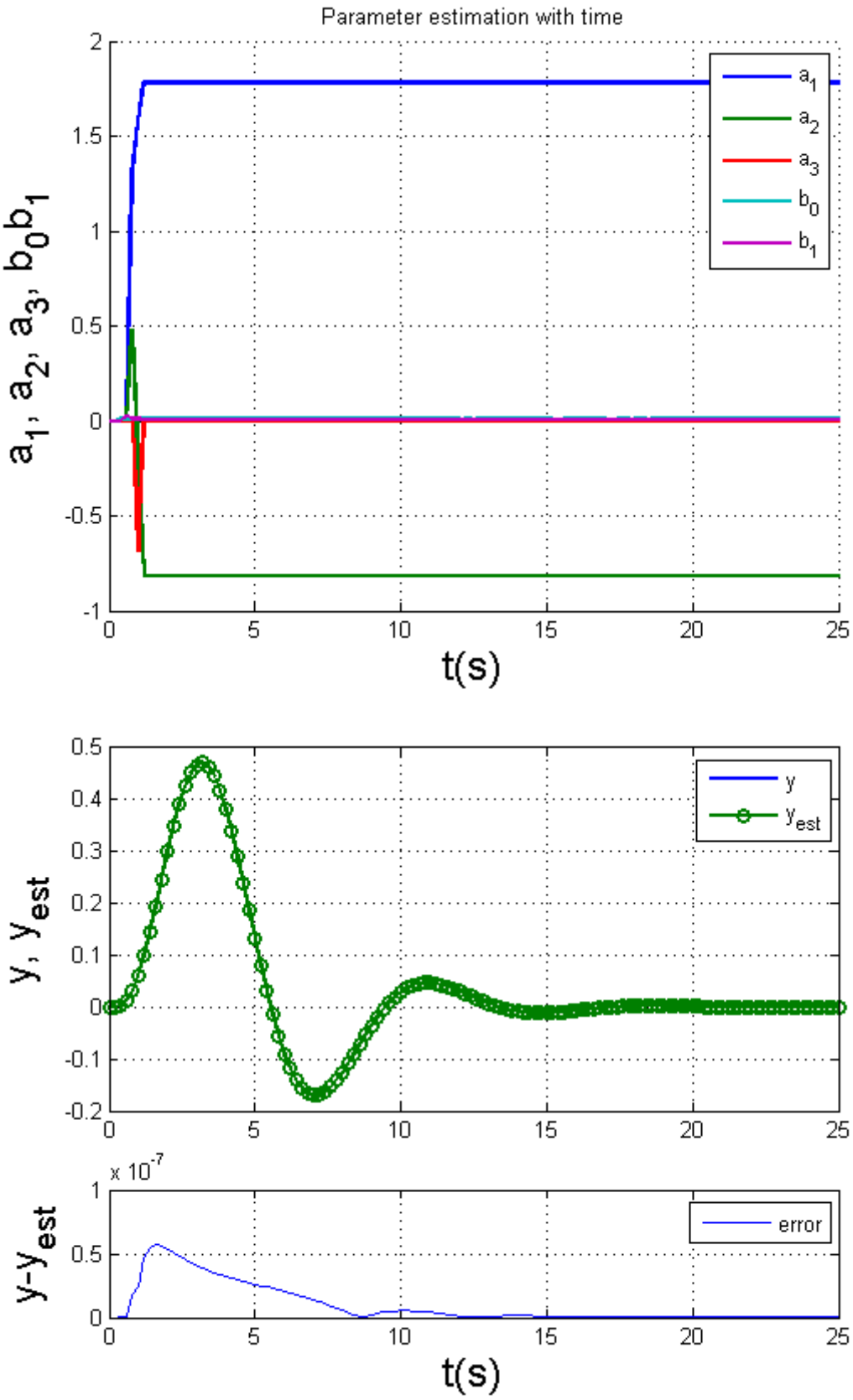
For 2^{nd} order estimation:





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

For 3^{rd} order estimation:



$$G(z) = \frac{0.009335z + 0.008734}{z^3 - 1.783z^2 + 0.8186z + 5.969e - 05}$$