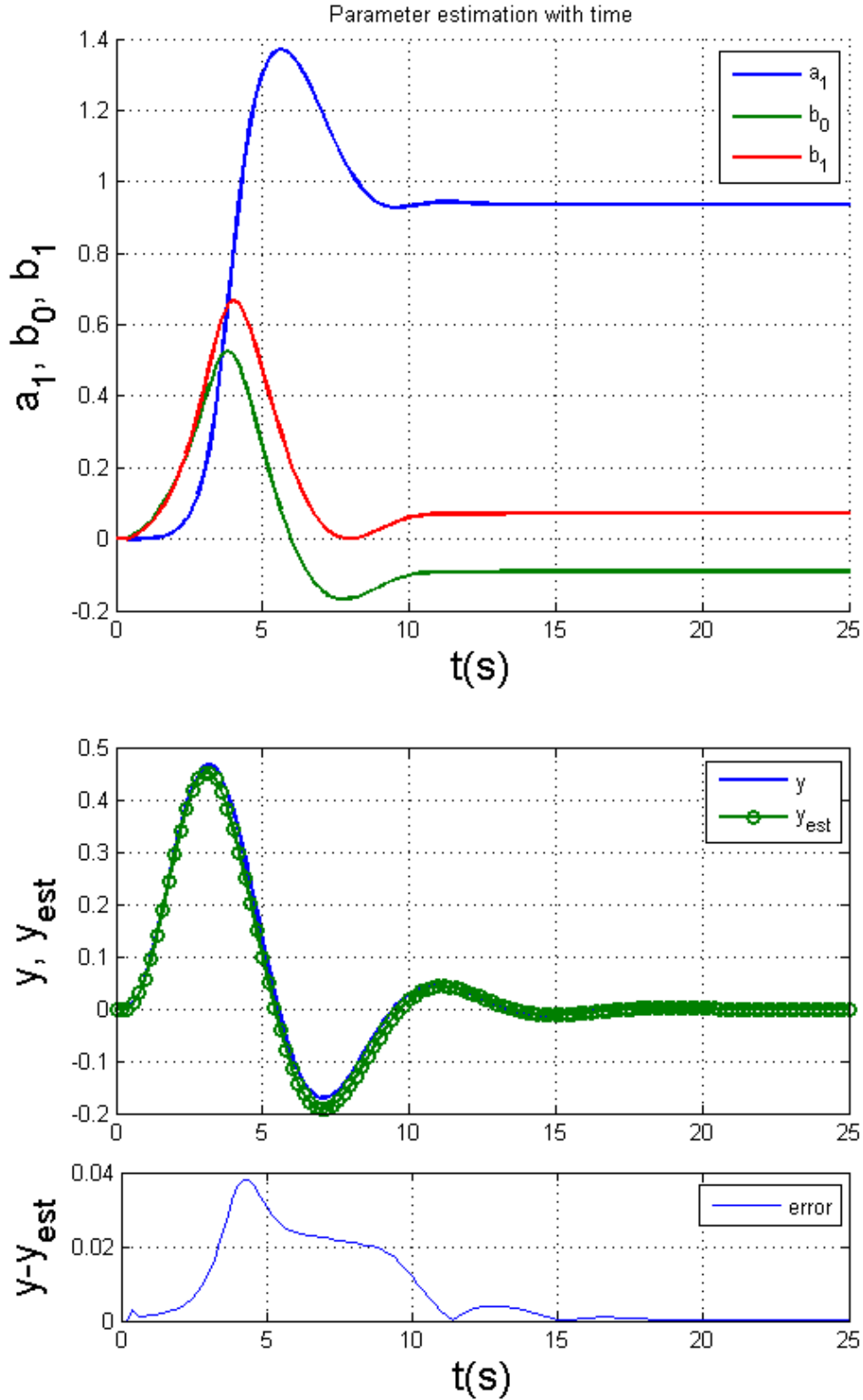# Problem statement:

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 Projection Algorithm
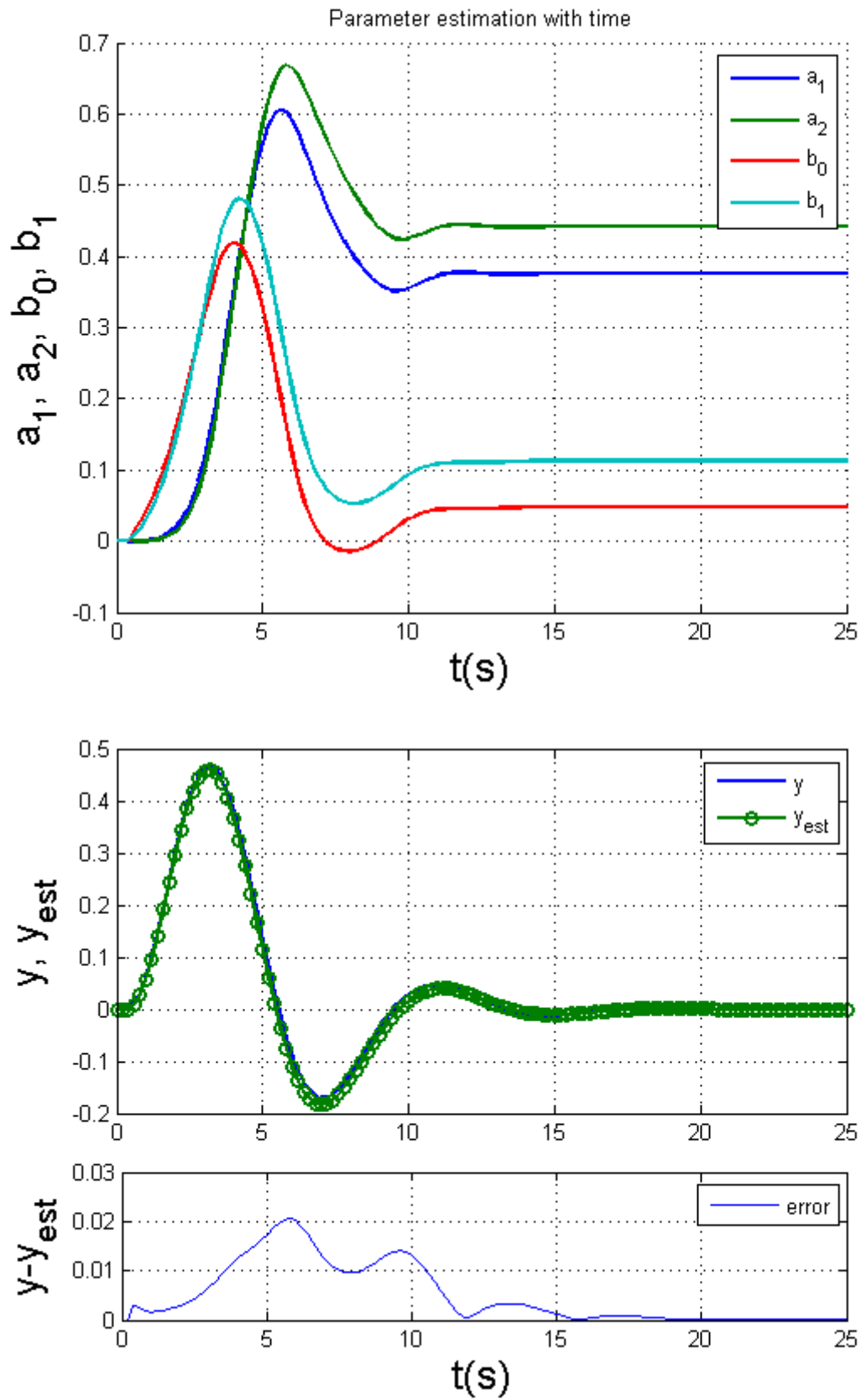
solution

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

For 1st order estimation:
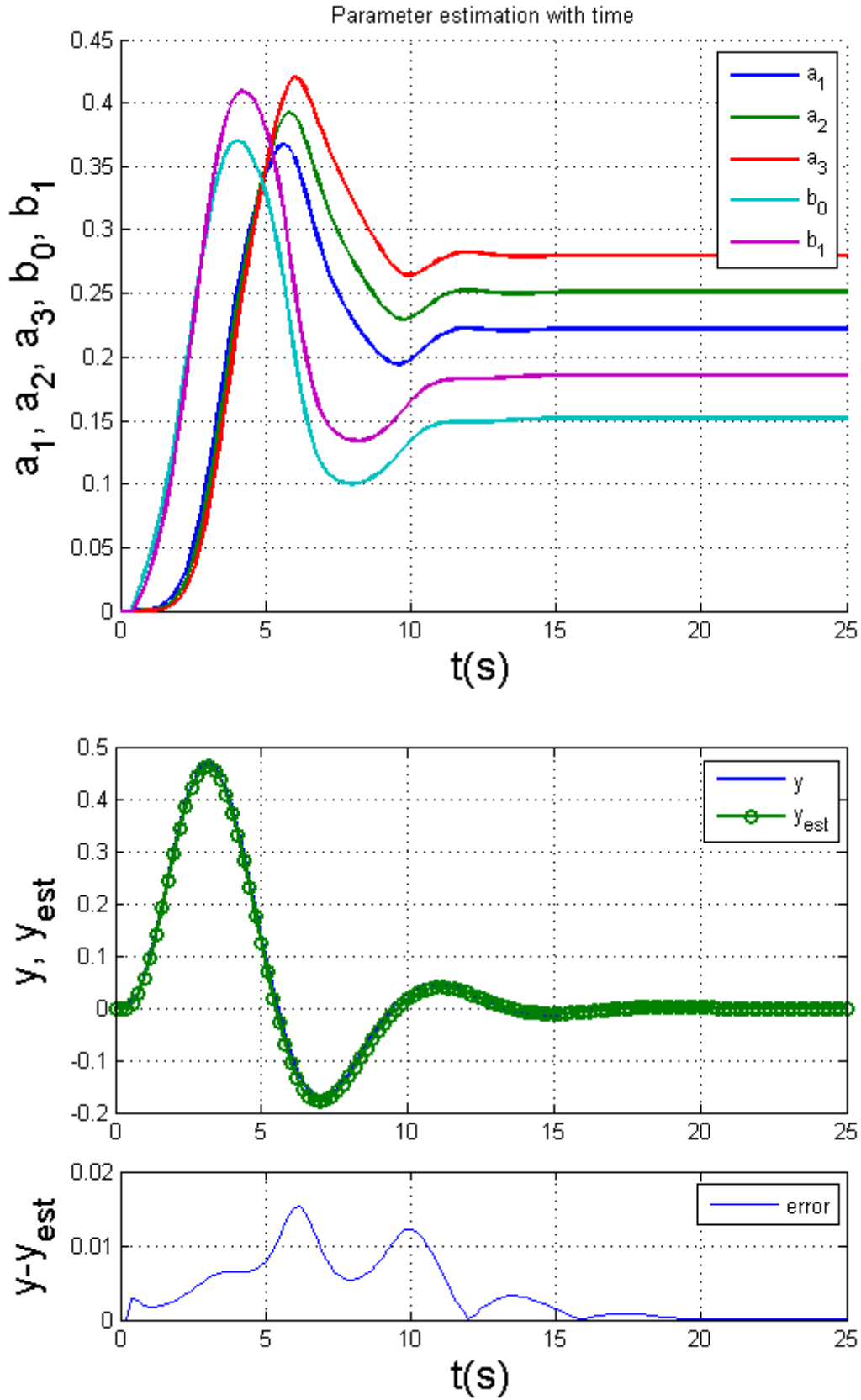

$$G(z) = \frac{-0.08966z + 0.07274}{z - 0.937}$$

For 2nd order estimation:

$$G(z) = \frac{0.04843z + 0.1131}{z^2 - 0.376z - 0.4418}$$

For 3rd order estimation:

Parameter estimation with time

$$G(z) = \frac{0.1517z + 0.1856}{z^3 - 0.2222z^2 - 0.251z - 0.2796}$$

Conclusion:

Although the parameter does not converge to the true parameter, the error of the output is not large.

The estimation depends on the parameters γ and α

Projection Algorithm is more stable than Kaczmarz Algorithm