Excitation
$$u(t) = u_1(t) + u_2(t) + u_3(t)$$

$$G(s) = \frac{\alpha_1}{s + \alpha_0}$$

$$\hat{\theta}(k) = \hat{\theta}(k - 1) + \mathbf{P}(k)\phi(k)\epsilon(k)$$

$$\mathbf{P}(k) = \frac{1}{\gamma} \left[\mathbf{P}(k - 1) - \frac{\mathbf{P}(k - 1)\phi(k)\phi(k)^T\mathbf{P}(k - 1)}{\gamma + \phi^T(k)\mathbf{P}(k - 1)\phi(k)} \right]$$

$$\epsilon(k) = y(k) - \phi^T(k)\hat{\theta}(k - 1)$$

$$\mathbf{P}(0) = \mathbf{P_0} = \mathbf{P_0}^{\mathsf{T}} > 0, \ \mathbf{P_0} = \rho \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, \ \phi = \begin{bmatrix} y(k - 1) & u(k - 1) \end{bmatrix}^{\mathsf{T}},$$

$$\theta = \begin{bmatrix} \theta_1 & \theta_2 \end{bmatrix}^{\mathsf{T}}, \ \hat{\theta} = \begin{bmatrix} \hat{\theta}_1 & \hat{\theta}_2 \end{bmatrix}^{\mathsf{T}}, \ \hat{\alpha}_0 = \frac{-\ln \hat{\theta}_1}{T_S}, \ \hat{\alpha}_1 = \frac{\hat{\alpha}_0 \hat{\theta}_2}{1 - \hat{\theta}_1}, \ \text{and}$$

$$T_S \text{ is sampling time.}$$

Estimates