Reference
$$r(t) = r_1(t) + r_2(t) + r_3(t) \xrightarrow{+} + \underbrace{E}_{S} \xrightarrow{\text{Controller}} \underbrace{U}_{S} \xrightarrow{\text{Plant}} \xrightarrow{\text{Output } (Y)} \xrightarrow{\text{Output } (Y)} \xrightarrow{\text{Least Squares identification method}} \text{Output } (Y)$$

$$P(k) = P(k-1) - \frac{P(k-1)\phi(k)\phi^{\intercal}(k)P(k-1)}{1+\phi^{\intercal}(k)P(k-1)\phi(k)} \xrightarrow{\hat{\theta}} \text{Estimates}$$

$$e(k) = z(k) - \phi^{\intercal}(k)\hat{\theta}(k-1)$$

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

$$P(0) = P_0 = P_0^{\intercal} > 0, P_0 = \rho \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, z = y(k) - y(k-1),$$

$$\phi = \begin{bmatrix} e(k-1) + e(k-2) \\ y(k-1) - y(k-2) \end{bmatrix}, \theta = \begin{bmatrix} \theta_1 \\ \theta_2 \end{bmatrix}, \hat{a} = -\frac{\ln \hat{\theta}_2}{T_S}, \hat{b} = \frac{2\hat{\theta}_1\hat{a}}{T_S(1-\hat{\theta}_2)K_I},$$
and T_S is sampling time.