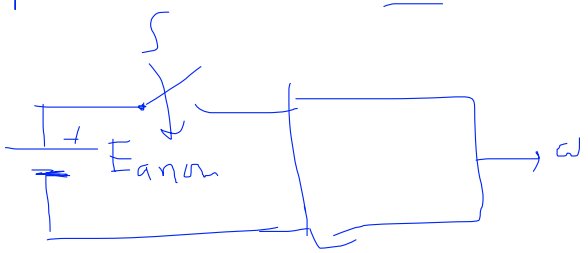
Model Nisbah Ahli :

$$G(s) = \frac{\omega(s)}{E_a(s)} = \frac{K_m}{L_a J s^2 + (B L_a + J R_a) s + (K_m K_b + B R_a)}$$

$$= \frac{K_m / L_a J}{s^2 + \frac{B L_a + J R_a}{L_a J} s + \frac{K_m K_b + B R_a}{L_a J}}$$

ditutup pada $t = 0$

$$\simeq \frac{K_0}{s^2 + 2\xi_0 \omega_n s + \omega_n^2}$$



$$e_a(t) = E_{nom}\, u(t)$$

$$E_a(s) = \frac{E_{anom}}{s}$$

$$\mathcal{L}\{u(t)\} = \frac{1}{s}$$

$$\omega(s) = G(s) \cdot E_a(s) = \frac{K_0 E_{anom}}{s(s^2 + 2\xi_0 \omega_n s + \omega_n^2)}$$

Hasil analitik :

$$\omega(t) = \mathcal{L}^{-1}\left\{ \frac{K_0 E_{anom}}{s(s^2 + 2\xi_0 \omega_n s + \omega_n^2)} \right\} \quad \text{utk } \xi < 1$$

$$\xi > 1 \longrightarrow \omega(t) = \mathcal{L}^{-1}\left\{ \frac{K_0 E_{anom}}{s(s+a)(s+b)} \right\}$$

$$\xi = 1 \longrightarrow \omega(t) = \mathcal{L}^{-1}\left\{ \frac{K_0 E_{anom}}{s(s+a)^2} \right\}$$

tabel Laplace

$$i_a(t) = \mathcal{L}^{-1}\left\{ \frac{E_{anom}}{s} H(s) \right\}$$

$$= \mathcal{L}^{-1}\left\{ \frac{E_{anom}\,[J s + B) K_0}{s(s^2 + 2\xi_0 \omega_n + \omega_n^2)} \right\}$$

Tugas 2 : $i_a(t)$

Tentukan $\omega(t)$ dan $i_a(t)$ analitik jika $e_a(t) = E_{anom}\, u(t)$