Roteiro 5-

At.3.

③⑥ $J_2 = \left(\dfrac{N_2}{N_1}\right)^2 J_1 + J_0 \left(\dfrac{N_2}{N_1}\right)^2$. $J_2 = \left(\dfrac{12}{4}\right)^2 \cdot 2 + 1 + \left(\dfrac{4}{16}\right)^2 \cdot 16 = 20 \, kgm^2$

$D_e = \left(\dfrac{N_2}{N_1}\right)^2 \cdot D_1 + D_2 + \left(\dfrac{N_2}{N_4}\right)^2 D_3 = 3^2 \cdot 1 + 2 + \dfrac{1}{16} \cdot 32 = 13 \, \dfrac{Nms}{rad}$

$K_e = \left(\dfrac{N_2}{N_4}\right)^2 \cdot K_g = \left(\dfrac{4}{16}\right)^2 \cdot 64 = 4 \, \dfrac{Nm}{rad}$

$T_0 = T_1 \left(\dfrac{N_2}{N_1}\right) = 3T$

$(J_2 n^2 + D_2 n + K_2) \cdot \Theta_2(n) = T_0(n)$ $\dfrac{\Theta_2(0)}{T(n)} = \dfrac{3}{20n^2 + 13n + 4}$

$(20n^2 + 13n + 4) \cdot \Theta_2(n) = 3T(n)$

③⑦

$J_0 = \left(\dfrac{N_2}{N_1}\right)^2 \cdot J_1 + J_2 + \left(\dfrac{N_1}{N_3}\right)^2 \cdot \left(\dfrac{N_2}{N_1}\right)^2 \cdot J_3 = 10^2 \cdot 3 + 150 + 2^0 \cdot 100 = 550 \, kgm^2$

$D_e = \left(\dfrac{N_1}{N_3}\right)^2 \cdot \left(\dfrac{N_2}{N_1}\right)^2 \cdot D_3 = 2^2 \cdot 500 = 2000 \, \dfrac{Nms}{rad}$

$K_e = \left(\dfrac{N_2}{N_1}\right)^2 \cdot K_1 + K_2 = 10^2 \cdot 3 + 300 = 600 \, \dfrac{Nm}{rad}$

③⑧ $J_e = 0 \, kgm^2$ $K_e = \left(\dfrac{N_4}{N_2}\right)^2 \cdot K_2 = \left(\dfrac{120}{23}\right)^2 \cdot 2 = 54,44 \, \dfrac{Nm}{rad}$

$D_e = D_4 = 26 \, \dfrac{Nms}{rad}$ $T_e = \left(\dfrac{N_4}{N_2}\right) \cdot \left(\dfrac{N_2}{N_1}\right) \cdot T = \left(\dfrac{120}{23}\right) \cdot \left(\dfrac{110}{56}\right) = 22,07T$

$\dfrac{\Theta_4(n)}{T(n)} = \dfrac{22,07}{26n + 54,44}$

AtN ?

(39) $- Je = \left(\frac{N4}{N3}\right)^2 \cdot J = \frac{1}{16} \cdot 1 = 0,0695 \, kgm^2$

$De = \left(\frac{N4}{N3}\right)^2 \cdot D_1 + D_2 = \frac{1}{16} \cdot 2 + 0,03 = 0,145 \, \frac{Nm}{rad}$

$Ke = \left(\frac{N4}{N3}\right)^2 \cdot k = \frac{1}{16} \cdot 2 = 0,125 \, \frac{Nm}{rad}$

$Te = \left(\frac{N4}{N3}\right)\left(\frac{N2}{N1}\right) \cdot T = \frac{1}{4} \cdot 4 \cdot T = T$

(40) $Je = \left(\frac{N3}{N4}\right)^2 \left(\frac{N1}{N2}\right)^2 (J_1 + J_4) + \left(\frac{N1}{N2}\right)^2 (J_3 + J_2) + (J_1 + J_2)$

$De = \left(\frac{N3}{N4}\right)^2 \cdot \left(\frac{N1}{N2}\right)^2 \cdot D_1 + \left(\frac{N1}{N2}\right)^2 \cdot D$

$ke = \left(\frac{N1}{N2}\right)^2 k$

$(Je \, n^2 + De \, n + ke) \, S_1(n) = T(n)$

$\frac{\theta_1(n)}{T(n)} = \frac{1}{Je \, n^2 + De \, n = k_2}$

(41) $Je_1 = \left(\frac{N3}{N4}\right)^2 \left(\frac{N1}{N2}\right)^2 \cdot (J_6 + J_5 + J_4) + \left(\frac{N1}{N2}\right)^2 (J_3 + J_2) + J_1$

$De_1 = \left(\frac{N3}{N1}\right)^2 \left(\frac{N1}{N2}\right)^2 \cdot 3D + \left(\frac{N1}{N2}\right)^2 \cdot D + D$

$ke_1 = \left(\frac{N4}{N4}\right)^2 \cdot \left(\frac{N1}{N2}\right)^2 \cdot k_2 + \left(\frac{N1}{N2}\right)^2 \cdot k_1$

$Te_1 = \left(\frac{N3}{N4}\right)\left(\frac{N1}{N2}\right) T$

$(Je_1 \, n^2 + De_1 \, n + ke_1) \, \theta_1(n) = Te(n)$

$\theta_1(n) = \frac{Te(n)}{Je_1 n^2 + De_1 n + ko_1}$

$Je_2 = \left(\frac{N2}{N1}\right)^2 \left(\frac{N4}{N3}\right)^2 J_1 + \left(\frac{N4}{N3}\right)^2 \cdot (J_2 + J_2)$

$De_2 = \left(\frac{N2}{N1}\right)^2 \cdot \left(\frac{N2}{N3}\right)^2 D + \left(\frac{N4}{N2}\right)^2 \cdot D + 3D$

$ke_2 = \left(\frac{N4}{N3}\right)^2 \cdot k_1 + k_2$

$Te_2 = T$