Q9 BLDC

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Ref. equation:

$$U_d(s) = (r_a + L_a s)\, I(s) + K_e \omega(s)$$

Where :

$U_d(s)$ = DC voltage

r_a = resistance

K = emf

ω = angular speed

I = phase current.

* electric Transfer function.

$$U_d(s) - K_e \omega(s) = (r_a + L_a(s))\, I(s)$$

$$\therefore \frac{I(s)}{U_d(s) - K_e \omega(s)} = \frac{1}{r_a + L_a s}$$

Transfer function of electric system.

* Transfer function (Mechanical)

$$T_e(s) - T_l(s) = (Js + Bv)\,\omega(s)$$

$$\therefore \frac{\omega(s)}{T_e(s) - T_l(s)} = \frac{1}{Js + Bv}$$

Transfer function of Mech. System.