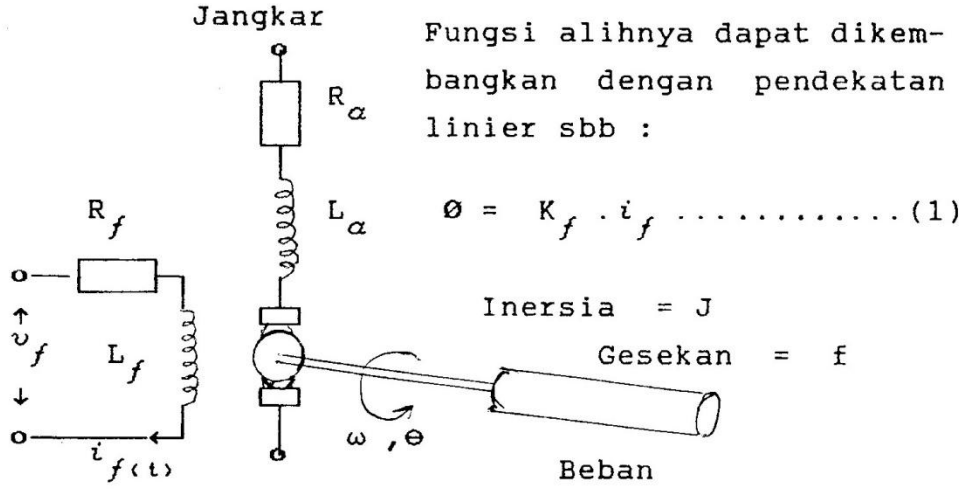
MOTOR DC SEBAGAI AKTUATOR DAYA



Fungsi alihnya dapat dikembangkan dengan pendekatan linier sbb :

$$\emptyset = K_f \cdot i_f \quad \ldots\ldots\ldots\ldots (1)$$

Torsi yang terjadi pada motor dianggap berbanding lurus dengan 0 , dikalikan arus jangkar :

$$T_m = K_1 \cdot \emptyset \cdot i_{\alpha(t)} \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$= K_1 K_f i_{f(t)} i_{\alpha 9t)}$$

Untuk medan berlaku :

$$V_{f(s)} = \left(R_f + L_f s \right) \cdot I_f s \quad \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Torsi motor = torsi yang dikenakan pada beban.

$$T_{m(s)} = T_{L(s)} + T_{d(s)} \quad \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

$T_{m(s)}$ = Torsi motor.

$T_{L(s)}$ = Torsi beban.

$T_{d(s)}$ = Torsi gangguan (disturbance).

Torsi beban untuk kelembaman putar (rotating inertia) dapat ditulis

$$T_{L(s)} = J s^2 \Theta_{(s)} + f s \Theta_{(s)} \quad \ldots\ldots\ldots\ldots (6)$$

Dari persamaan (3), (4) dan (5)

$$T_{L(s)} = T_{m(s)} - T_{d(s)}$$

$$T_{m(s)} = K_m I_{f(s)}$$

$$T_{m(s)} = K_m I_{f(s)}$$

$$I_{f(s)} = \frac{V_{f(s)}}{R_f + L_f s}$$

Fungsi alih kombinasi motor dan beban .

$$\frac{\Theta_{(s)}}{V_{f(s)}} = \frac{K_m}{s(Js + f)(L_f s + R_f)}$$

$$= \frac{K_m / J L_f}{s \left(Js + \frac{f}{J}\right) \left(L_f s + R_f / L_f\right)}$$

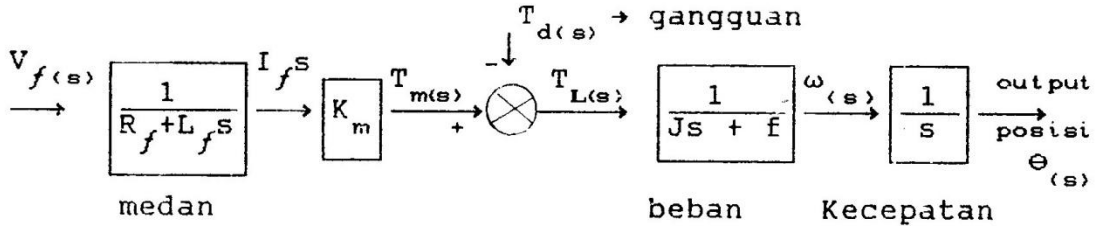
Jika dinyatakan dalam tetapan waktu

$$\frac{\Theta_{(s)}}{V_{f(s)}} = G_{(s)} = \frac{K_m / f R_f}{s \left(\tau_f s + 1\right) \left(\tau_L s + 1\right)}$$

$$\tau_f = \frac{L_f}{R_f} \quad ; \quad \tau_L = \frac{J}{f} \quad . \text{ Umumnya } : \tau_f > \tau_L$$

sehingga T_f biasa diabaikan.

Balok diagramnya;



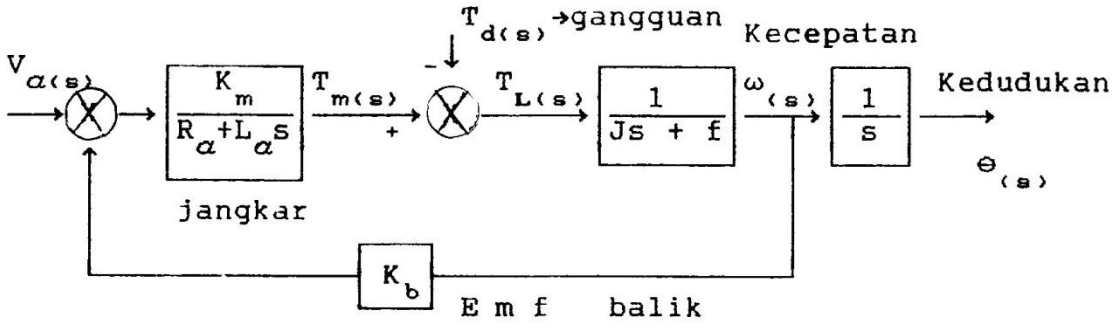
Analog untuk motor dengan pengaturan jangkar:

$$G_{(s)} = \frac{\theta_{(s)}}{V_{a(s)}} = \frac{K_m}{s\left[R_a (JS + F) K_b K_m \right]}$$

$$= \frac{\left[K_m / (R_a f + K_b K_m \right]}{s (\tau_1 s + 1)}$$

$$\tau_1 = \frac{R_a J}{\left(R_a f + K_b K_m \right)}$$

Diagram baloknya:



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