

Motor

DC motor model

$$u = Ri + L \frac{di}{dt} + E$$

$$i = \frac{1}{K_t} \tau_m \quad E = K_t \omega_m$$

Where:

- u is the voltage applied to the armature of the motor. $[V]$
- R is the armature resistance. $[\Omega]$
- E is the back EMF. $[V]$
- K_t is the torque constant. $[Nm/A]$ or $[Vs]$
- ω_m is the angular velocity of the motor. $[\mathrm{rad/s}]$
- τ_m is the motor torque. $[Nm]$

This can be rewritten as:

$$\frac{K_t}{R} u = \tau_m + T_e \frac{d\tau_m}{dt} + \frac{K_t^2}{R} \omega_m$$

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