Bab I Pemodelan Motor DC (Armature Controlled)

* Model STATIS

$1\ RPM = \frac{2\pi}{60}\ rad/sec$

energi listrik → MOTOR → energi mekanik

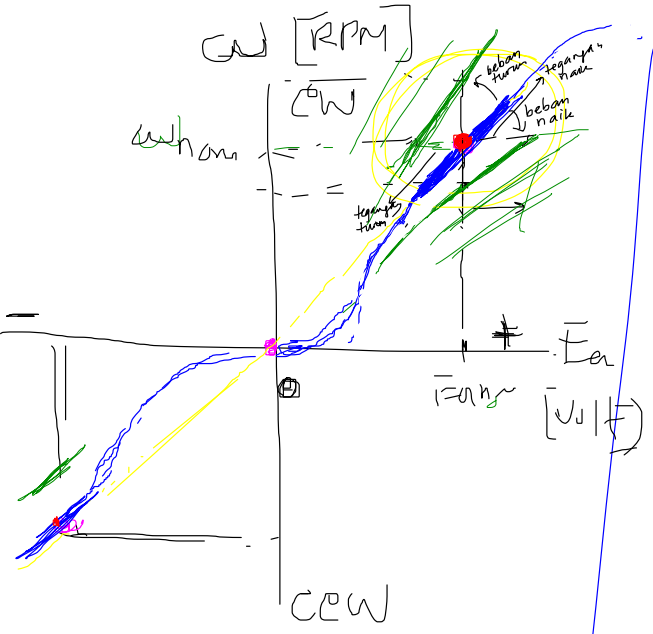
$\omega = K \cdot E_a$

$K = \frac{\omega\ nominal}{E_a\ nominal}$

E_a [Volt]

rating

ω [RPM, rad/sec]



PPML 12/02/13 — Pemodelan dan Pengendalian MOTOR LISTRIK

8 pekan : Motor DC Terkendali Jangkar (Armature-Controlled DC Motor)

Tugas 1 (dikumpul 19/02/13)
Motor DC Terkendali Jangkar "U.S Motors"
- Merk, Type,
- Spesifikasi : HP, P, ω_{nom} (KPM, rad/sec)
- Data (Ra, La, J, B) Km, Kb Ia, Ea

Referensi
http://www.unhas.ac.id/rhiza/arsip/kuliah
→ PPML

PENILAIAN :
* Tugas 2
* Test tertulis
digabung dengan nilai dari pak Faizal (TK) pak Safar (TE)

Materi : Bab I Pemodelan Motor DC
* Model Statis
* Model Dinamis/Analitik
  - Model Fisik
  - Model Nisbah Alih
  - Model Ruang Keadaan
* Model simulink/Numerik (LAPTOP/MATLAB)

Bab II Pengendalian Motor DC
* Pengendalian Open Loop START/STOP
* Pengendalian Closed-Loop (dengan feedback)

ω_{nom} : Kecepatan NOMINAL

E_{anom} : Tegangan Jangkar NOMINAL

Model statis :
* Model steady state (Keadaan Tunak) ≠ Transient
* Watak Alih (transfer characteristic)

* Model Dinamik

Diturunkan dari Model Fisik (Rangkaian Listrik)

Nominal

Ea, P (HP / kW)

Ia, R (RPM)

Ra, La, J, B

Km, Kb

** Rangkaian Listrik : (Hukum Ohm)

$$(1)\quad e_a(t) - e_b(t) = R_a i_a(t) + L_a \frac{di_a(t)}{dt}$$

* Mekanik (Hukum Newton)

$$(2)\quad T(t) = J\frac{d\omega(t)}{dt} + B\omega(t)$$

$T(t)$ = torque : $[N.m]$

$$\left[kg\,m/sec^2\right]\cdot m = \left[kg\,\frac{m^2}{sec^2}\right]$$

$$\frac{d\omega(t)}{dt} = \left[\frac{rad}{sec^2}\right] \qquad B = \left[\frac{N.m}{rad/sec}\right]$$

$$\omega(t) = \left[\frac{rad}{sec}\right] \sim [RPM] = \left[\frac{kg\,m^2}{rad.sec}\right]$$

$$J = \left[\frac{N\,m}{rad/sec^2}\right] = \left[\frac{kg\,m^2}{rad}\right]$$

$$\hookrightarrow [lb\,ft^2] \sim [kg\,m^2]$$

* Sifat Motor

$$(3)\quad T(t) = K_m i_a(t)$$

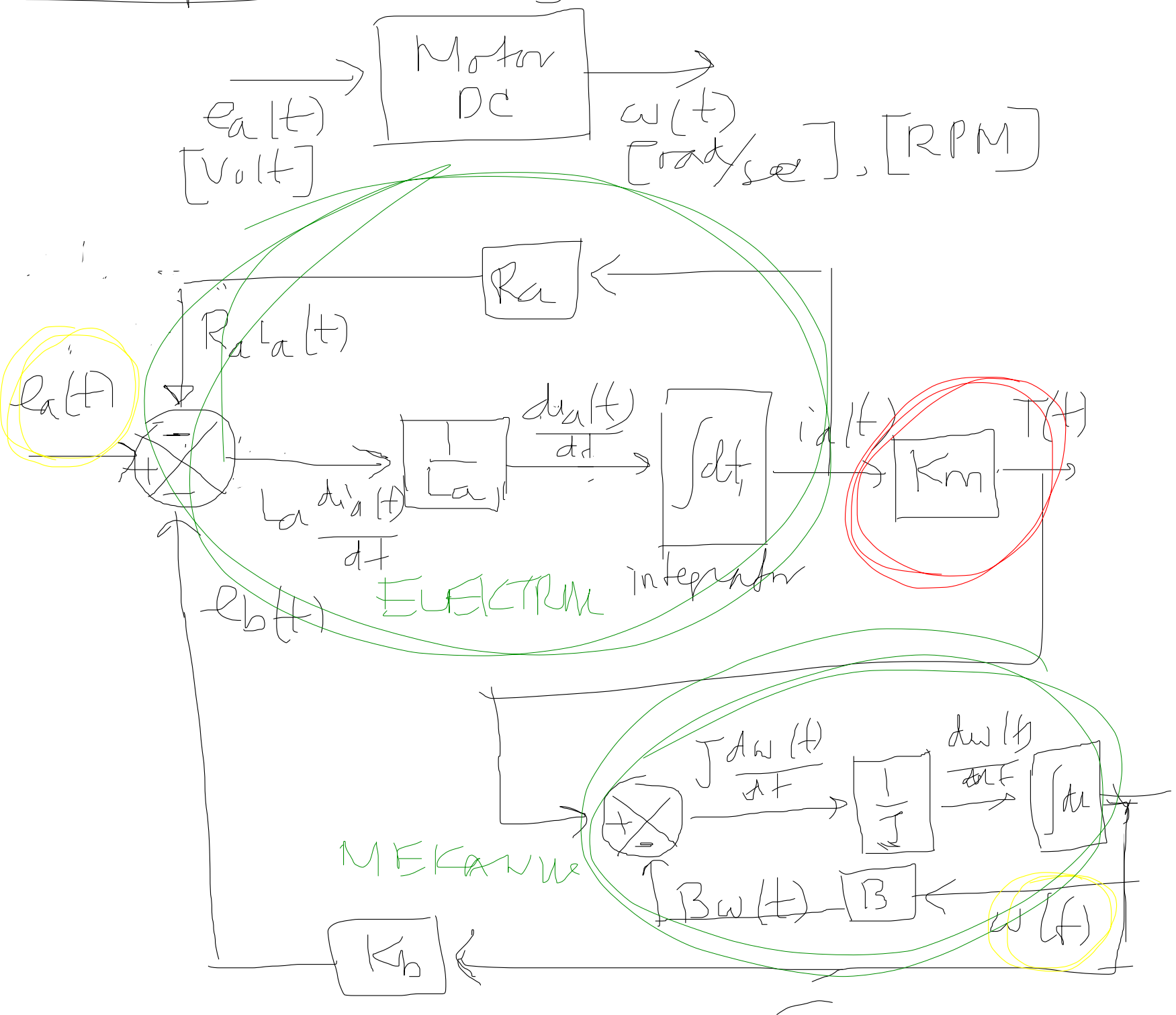
* Sifat Generator

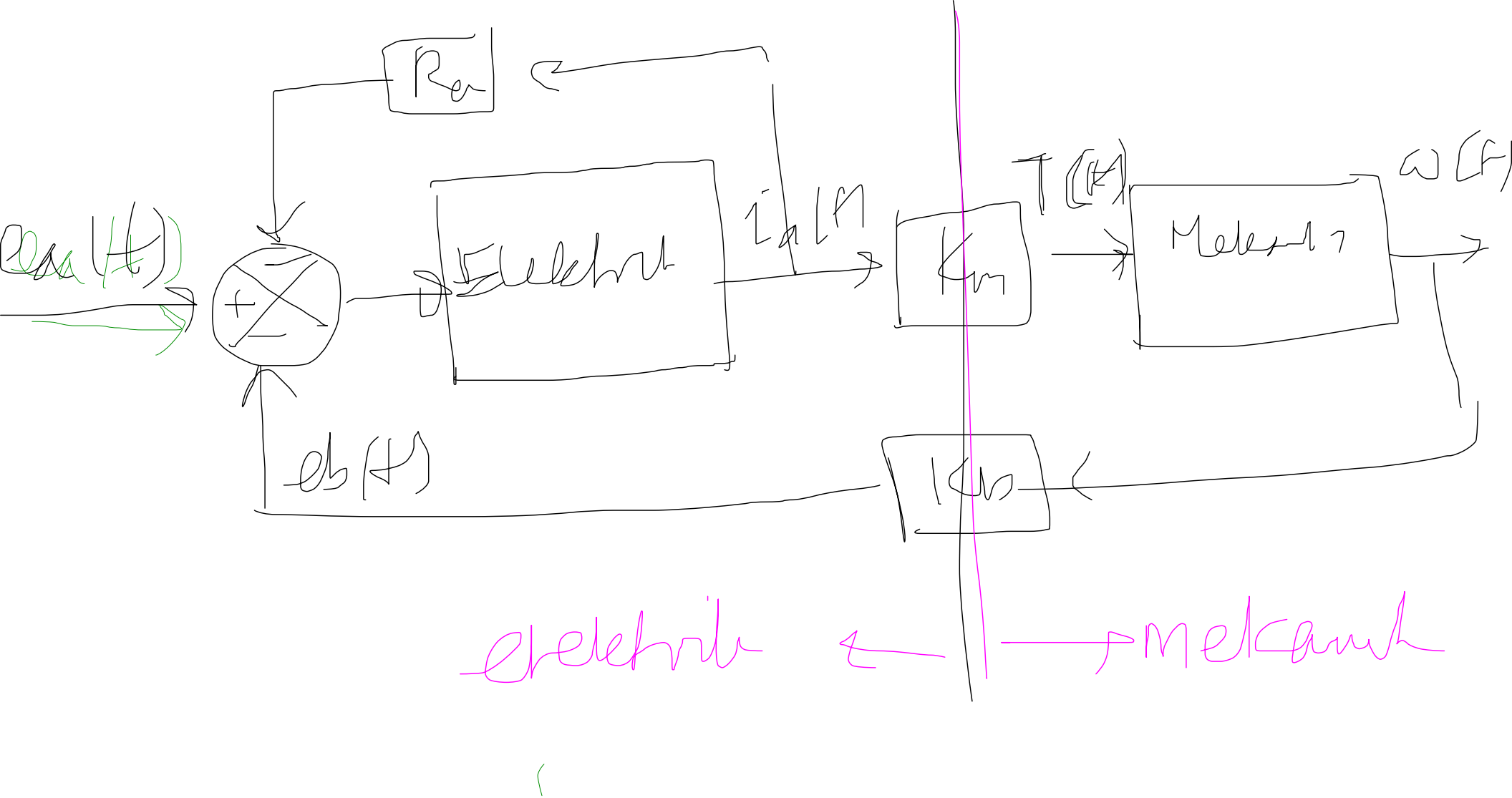
$$(4)\quad e_b(t) = K_b \omega(t)$$

K_m = Konstanta motor

K_b = Konstanta generator

✱ Representasi Bagan Kotak




Ra
Ia(t)
Km
T(t)
ω(t)
eb(t)
Kω
electrique
mecanique