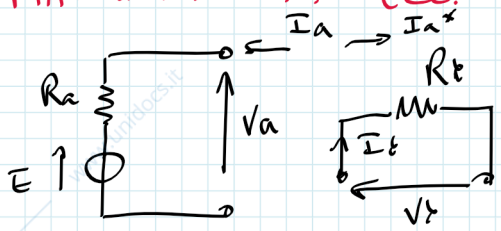
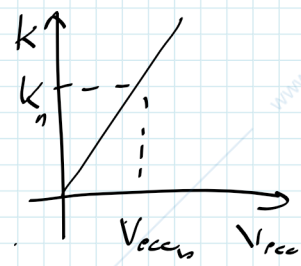
MACCHINA C.C. ECC. INDIP.



$V_a = E - R_a I_a$ ← GEN. MOTORE

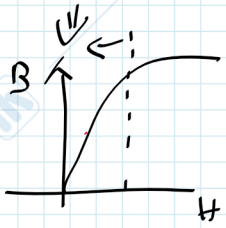
$$\begin{cases} V_a = E + R_a I_a \\ V_f = R_f I_f \\ E = k(V_{ecc})\,\omega \\ T = k(V_{ecc})\,I_a \end{cases}$$



$$k(V_{ecc}) = k' \frac{V_{ecc}}{\uparrow}$$

$$E = \underbrace{N \cdot B \cdot l \cdot R}_{k} \cdot \omega$$

$$T = \underbrace{N B l R}_{\uparrow} I_a$$

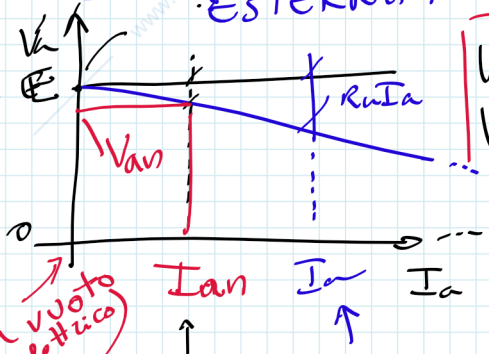


ω = fissata $\Rightarrow \frac{V_{ecc1}}{V_{ecc2}} = \frac{E_1}{E_2}$

GENERATORE

CARATTERISTICA ESTERNA $\quad V_a = f(I_a)$

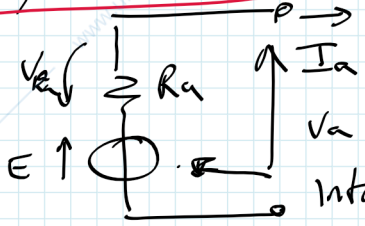
→ A ω = fissata, V_f, I_f = fissata $\quad V_a, I_a$



ω = cost
V_{ecc} = cost

cost ∫ cost

$E = cost = k\omega$



Interazione elettrom.

$R_a I_{an} = \frac{1}{50} E \rightarrow I_{cc} = 50\, I_n$ non sopportabile

DATI NORMALI → I_{an} corrente nominale
V_{an} tensione nominale
$V_n I_n$ potenza elett. erogata nomin.

EI_{an} ⇒ potenza meccanica entrante = $T \cdot \Omega$

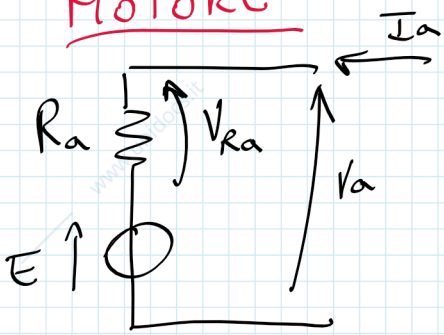
$EI_{an} > V_{an} I_{an}$ $\quad (R_a I_n^2)$ $\quad EI_{an} = V_{an} I_{an} + R_a I_n^2$

$$\eta = \frac{V_n I_{an}}{EI_{an}\ (+ R_f I_f^2)} \quad P_{ecc}$$

I_n, I_{an} ← armatura.
I_{en}, V_{en} ← eccitazione

$V_{an} I_{an} = P_n$ POTENZA ELETTRICA GENERATORE

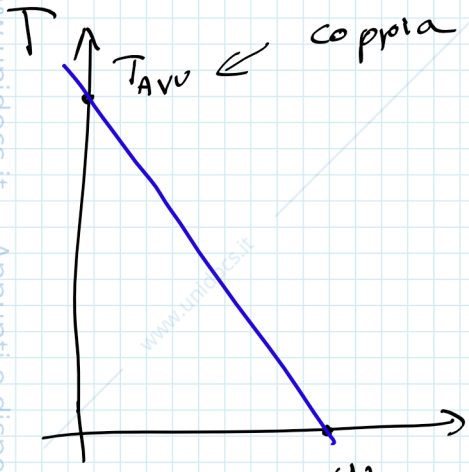
MOTORE



$$\begin{cases} V_a = E + R_a I_a \\ V_{ecc} = R_{ecc} I_f \\ E = K\omega \\ T = K I_a \end{cases} \qquad T = f(\omega)$$

CARATTERISTICA MECCANICA → T, ω

V_a fissato
V_{ecc} fissata
$\Rightarrow K = cost$



$T_{AVV} \Rightarrow \omega = 0 \Rightarrow E = 0 = K\omega$

$V_a = E + R_a I_a \Rightarrow V_a = R_a I_a \Rightarrow T = K I_a = K \frac{V_a}{R_a}$

$$T_{AVV} = K \frac{V_a}{R_a}$$

$$\omega_0 = \frac{V_a}{K}$$

$\omega_0 \Rightarrow T = 0$

$T = K I_a \Rightarrow I_a = 0$

$V_a = E + R_a I_a \qquad I_a = \frac{V_a - E}{R_a} = 0$

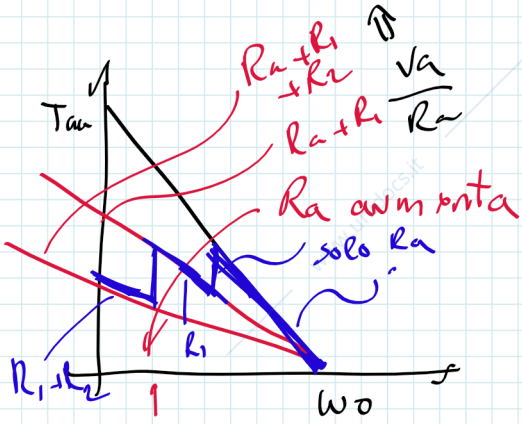
$\Rightarrow V_a = E - K\omega_0$

$\omega_0 = \frac{V_a}{K}$

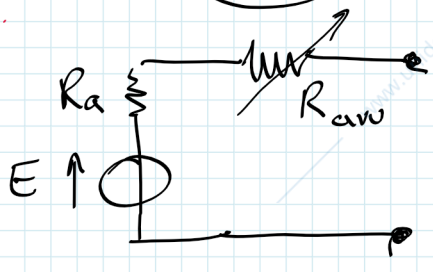
$$T(\omega) = K \cdot I_a = K\left(\frac{V_a - E}{R_a}\right) = K\left(\frac{V_a - K\omega}{R_a}\right) = \left(\frac{K V_a}{R_a}\right) - \frac{K^2 \omega}{R_a}$$

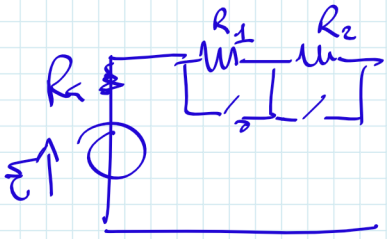
($E = 0$; $\frac{K V_a}{R_a} = T_{AVV}$; retta a pendenza negativa)

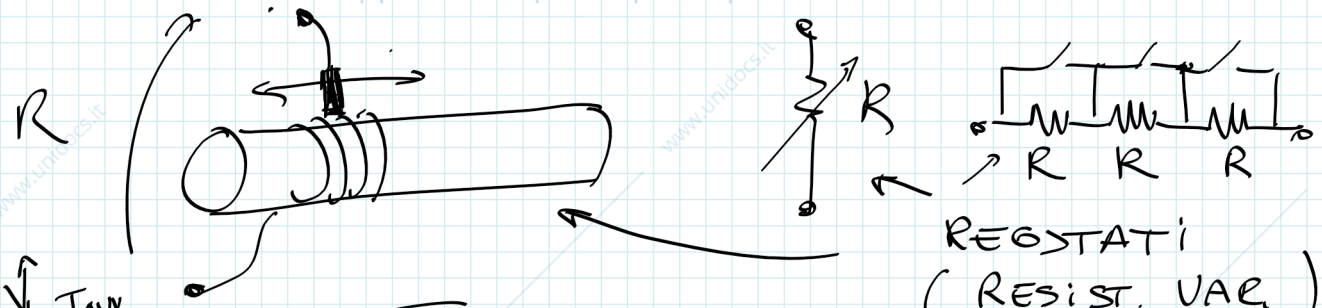
$T_{avv} = K I_{cc}$ molto elevata, potrebbe non oss. sopp.



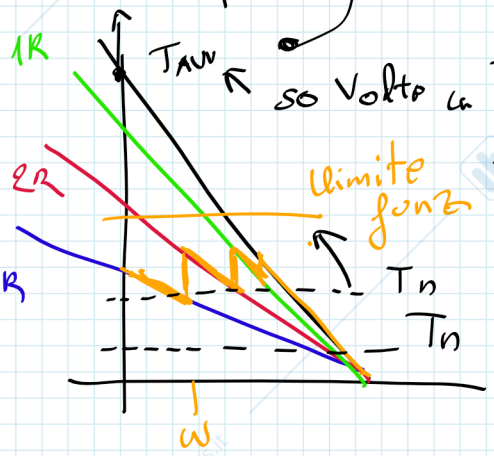
$T_{avv} = K \frac{V_a}{R_a}$ → per dim tavv. aumento Ra







REOSTATI
(RESIST. VAR.)

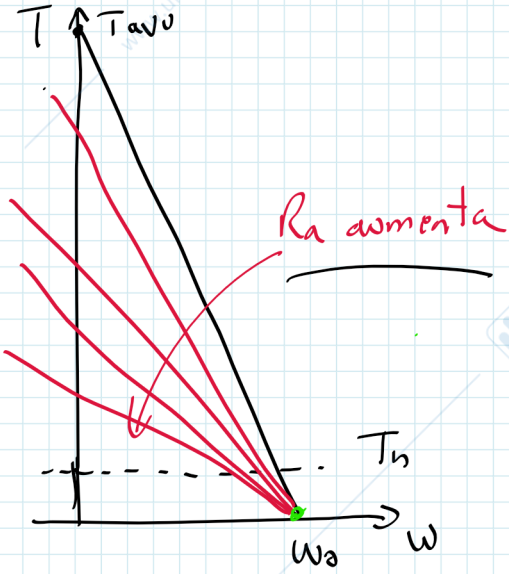


so Volte la $T_n = K I_{an}$

$T_{AW} = K I_{cc}$

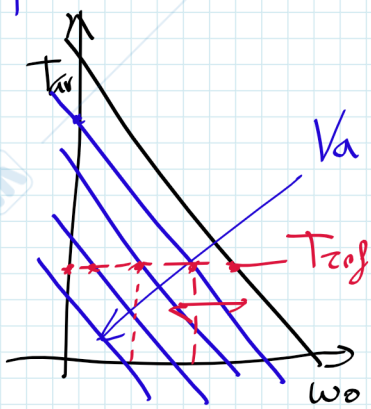
so I_{an}

I_{an} nominale
I_a valore generico



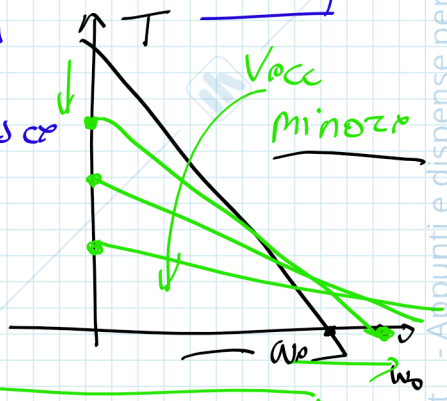
$T_n = K I_{an}$

$T_{AW} = K I_{cc} = K \frac{V_a}{R_a}$



$I_{cc} = so I_{an}$

$w_0 = \frac{V_a}{K}$



$K' V_{cc} = K(V_{cc})$

non si usa mai per regol. T perché sfrutto poco il ferro.

Si usano solitamente questi

difficile farlo variare ⇐ Lecc grande

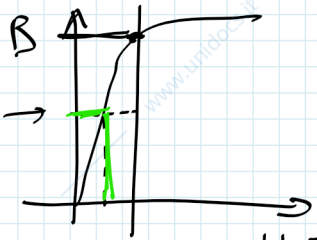
→ Va fissata

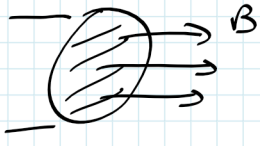
↓ diminuisco ecc → solo se voglio aumentare w_0 (Diminuisce però la coppia)

DEFLUSSAGGIO

$P_n = E_n \cdot I_{an}$ (MECCANICA)

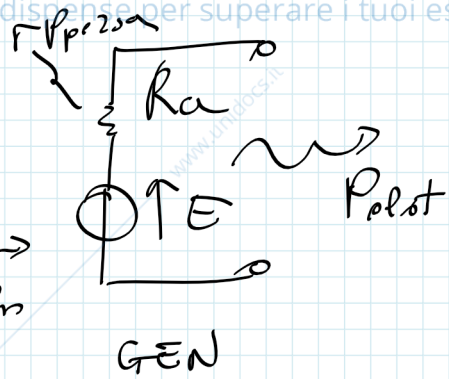
MOTORE

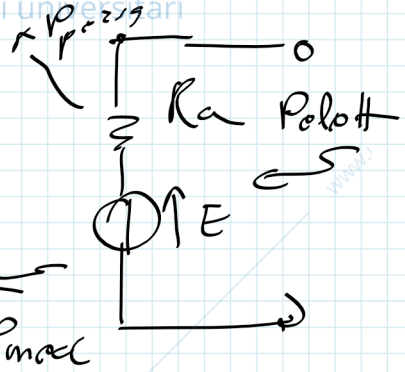




$\varphi = BA$

$$\eta = \frac{P_{erogata}}{P_{assorbita}}$$



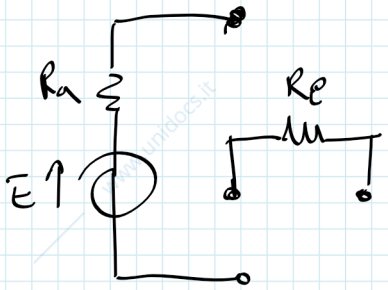


$V_a I_a$ → P_{mc}

$$\eta_g = \frac{P_{elett}}{P_{macc}} = \frac{E I_a}{V_a I_a} < 1$$

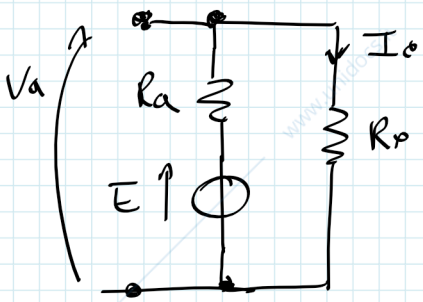
$$\eta_m = \frac{P_{macc}}{P_{elet}} = \frac{E I_a}{V_a I_a} < 1$$

$$P_{mec} = T \cdot \omega = E I_a$$



ECC. INDIPENDENTE (SEPARATA)

MOTORE, GEN.



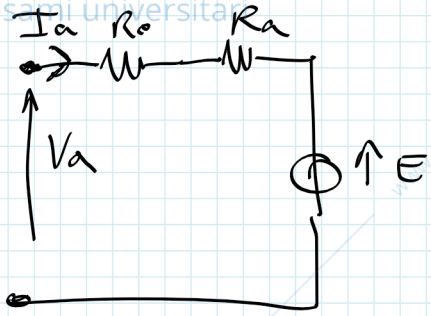
ECC. PARALLELO

$V_a = cost \Rightarrow I_e = cost$

MOTORE → MOTORE ECC. SEPARATA

$R_p \gg R_a \rightarrow I_p \ll I_a \Rightarrow I_f = 0$

MOTORE, GEN



ECC TIPO SERIE

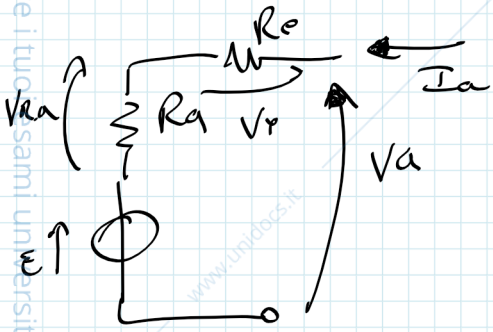
$R_e \simeq R_a$

GEN: NON PUÒ FUNZ perché se $I_a = 0$

non posso funz. a vuoto

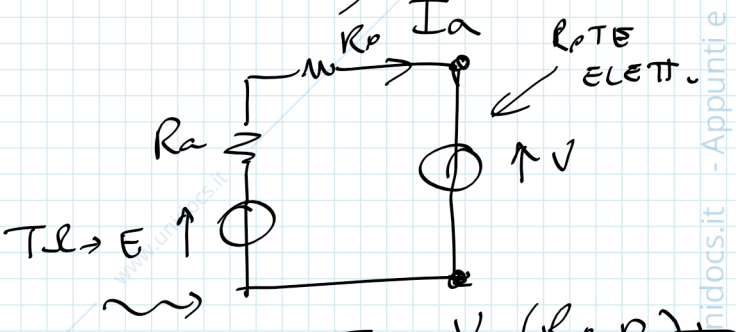
potrebbe funz. come gen solo se c'è la rete elettrica (Va)

MOTORE ECC. SERIE



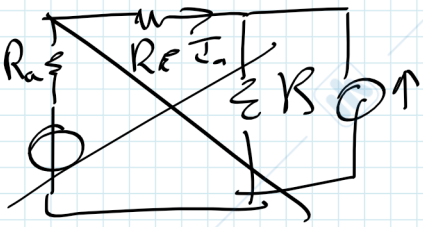
$$\begin{cases} V_a = E + R_a I_a + R_e I_a \\ E = K(I_a)\,\omega \\ T = K(I_a) I_a \end{cases}$$

$$I_a = \frac{V - E}{R_a + R_e}$$



$E = V_t + (R_p + R_a) I_a$

funz. come gen



$K\omega = E$

$E = K(I_a)\,\omega$

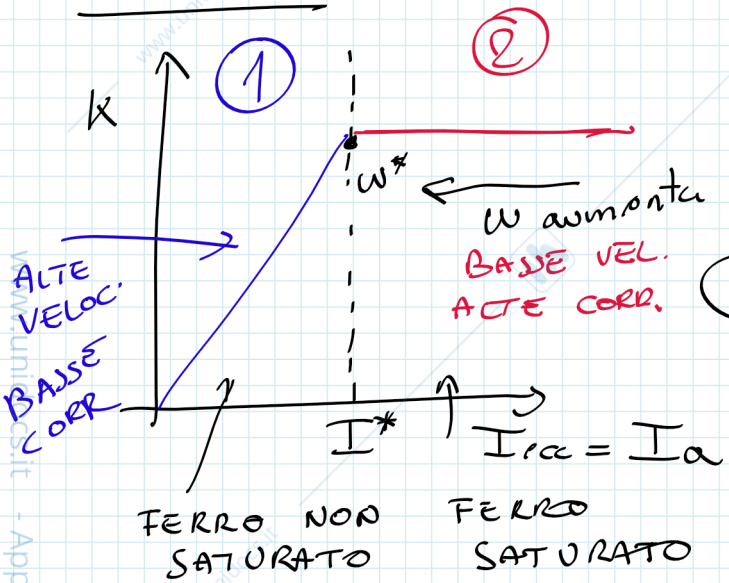
$\| \quad I_p = 0 \Rightarrow K \simeq 0$

$I_p \quad \Downarrow$

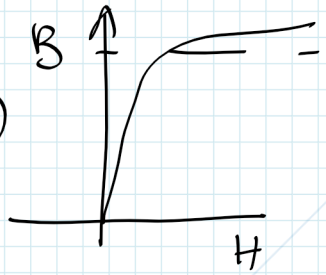
$E = 0$

Devo Trovare $K(I_a)$

IPOTESI → FERRO SATURABILE



① $K = K_1 \cdot I_a$



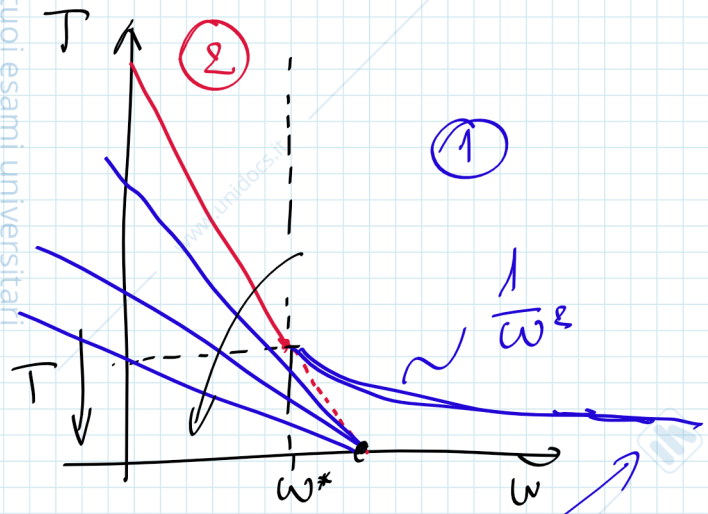
② $K = K_2$ costante

$V_a = cost$

② I_a elevata → $I_a = \dfrac{V_a - E}{R_a + R_b}$ ⇒ quando E piccolo ⇒ a bassa velocità cioè alla partenza

$$\begin{cases} V_a = E + (R_a + R_b) I_a \\ E = K_2 \omega \\ T = K_2 I_a \end{cases}$$

MACC. ECC. IND.

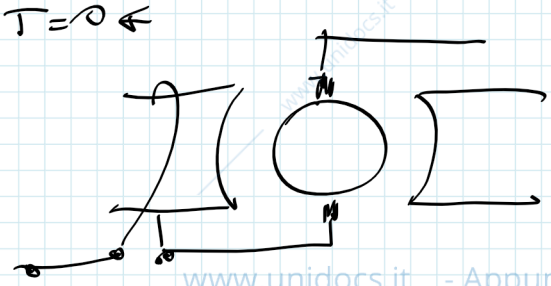


$V_a = cost$

ω FUGA ∞

$T = 0$

ω = ∞
T = 0



① $$\begin{cases} V_a = E + (R_a + R_b) I_a \\ E = K_1 I_a \cdot \omega \\ T = K_1 I_a \cdot I_a = K_1 I_a^2 \end{cases}$$

$$V_a = K_1 I_a \omega + (R_a + R_b) I_a$$

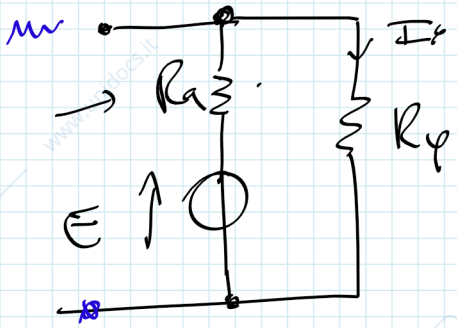
$$V_a = (K_1 \omega + R_a + R_b) I_a$$

$$I_a = \frac{V_a}{K_1 \omega + R_a + R_b}$$

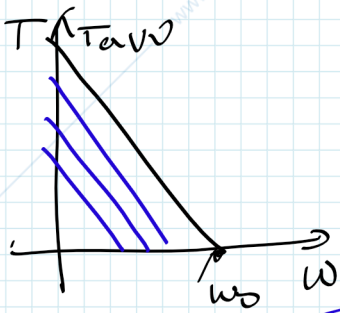
$$T = K_1 \left(\frac{V_a}{K_1 \omega + R_a + R_b} \right)^2 \simeq \frac{1}{\omega^2}$$

$T, \omega \rightarrow \dfrac{V_a = \text{costante}}{(I_{ec})}$

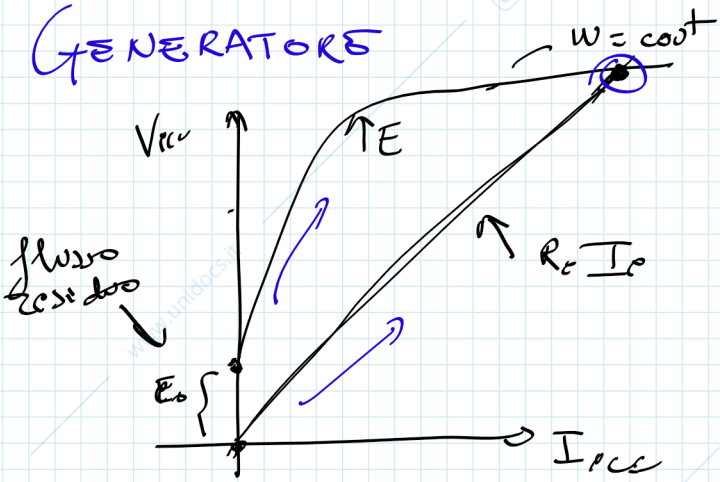
ECC. PARALLELO



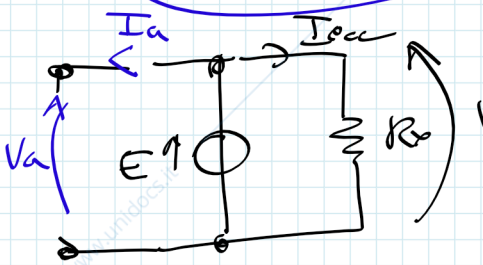
MOTORE → T, ω → V_a = cost ⇓ I_e = cost



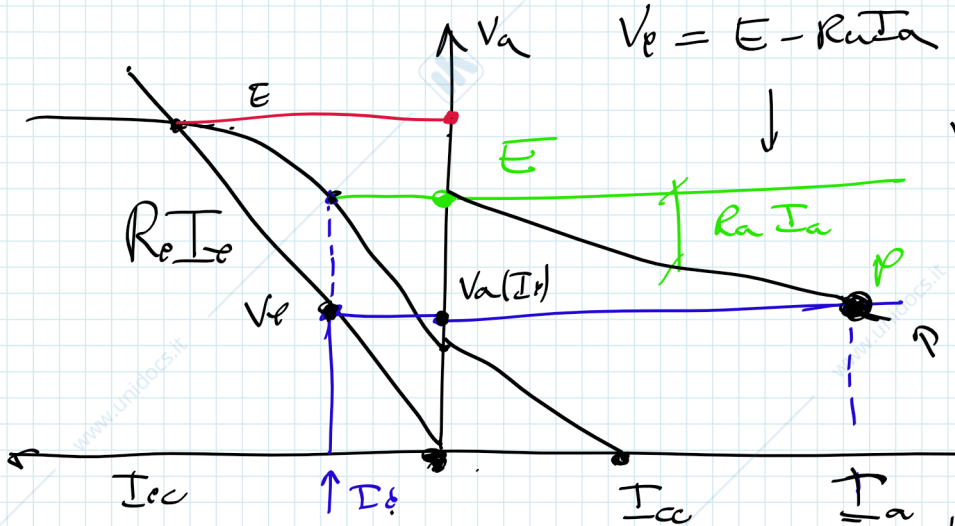
GENERATORE

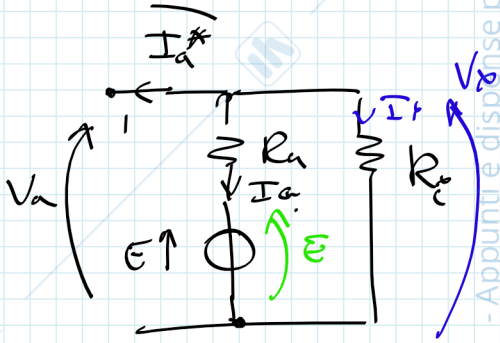


R_a cc R_e

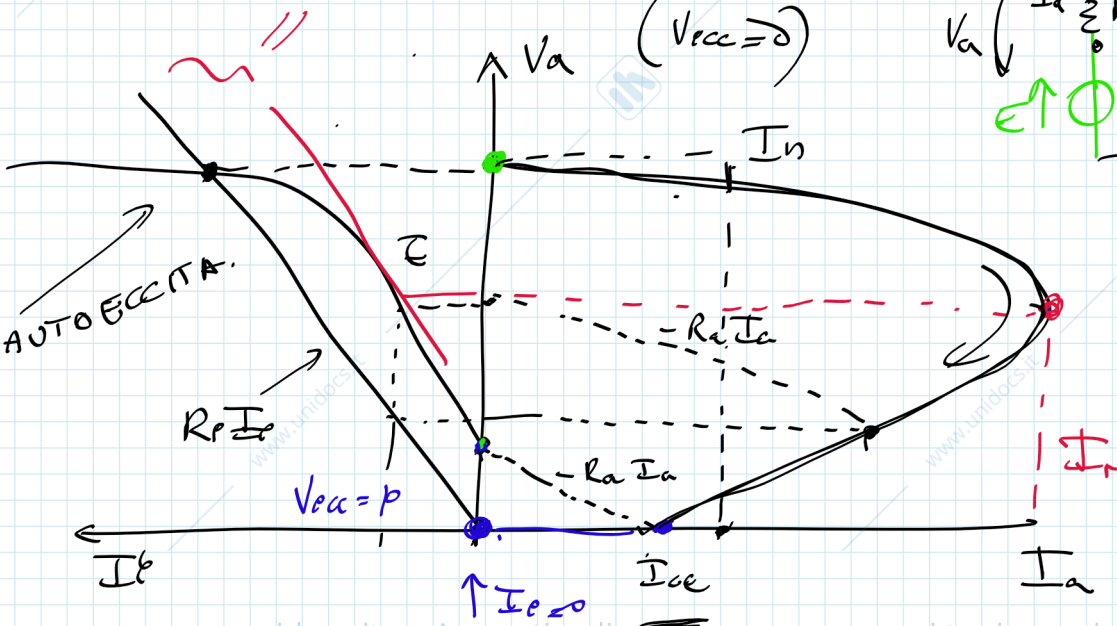


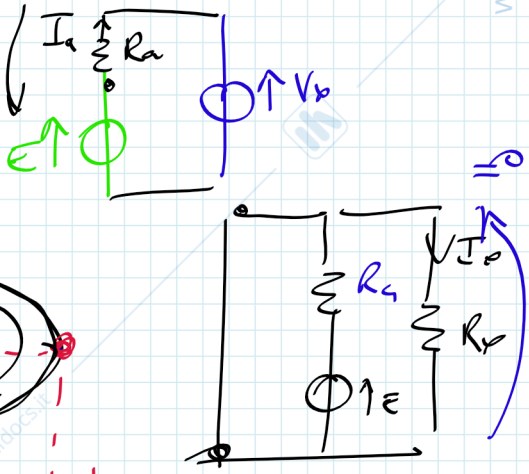
caratteristica esterna → V_a, I_a

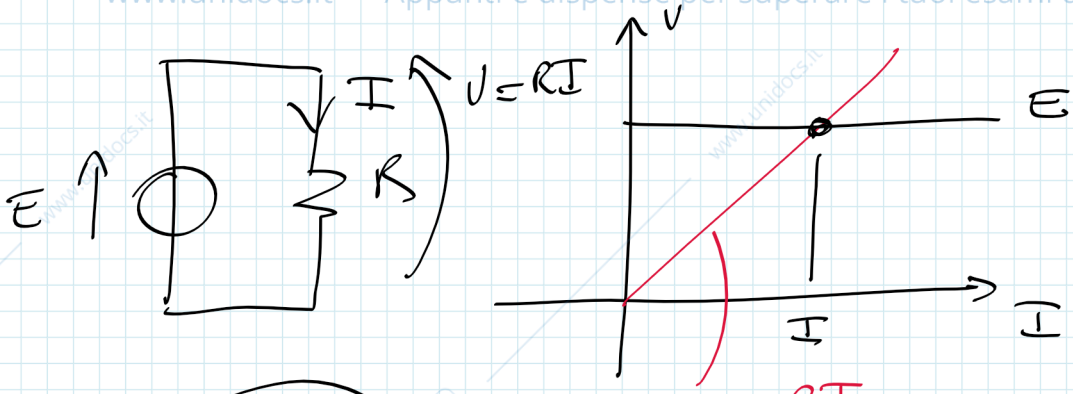




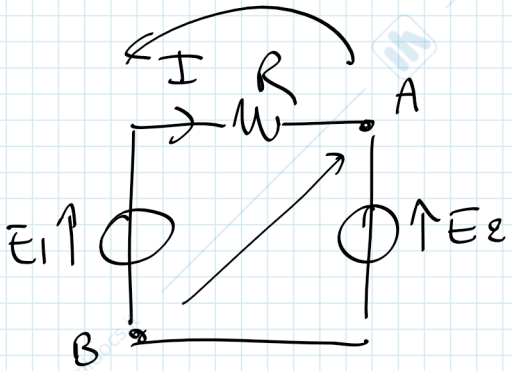
I_e è trasc. rispetto a I_a ⇓ $I_a^* \simeq I_a$







$V = RI$



$$V_{AB} = \mathcal{E}_1 - RI = \mathcal{E}_2$$