# 2.13 Toerentalvariatie

$$M_k = \pm \frac{3}{\omega_s} \cdot \frac{U_1^2}{k^2} \cdot \frac{1}{2 \,.\, X_{2,ST}}$$

## 2.13.3 Slip

### *2.13.3.1 Statorspanning*

① $n_s = \frac{60 \,.\, f_s}{p} \xrightarrow{U_1 \text{ var}} n_s = c^{te}$

② $s_k = \pm \frac{R_2}{X_{2ST}} \xrightarrow{U_1 \text{ var}} s_k = c^{te}$

③ $M_k \sim U_1^2 \longrightarrow M_k$ kwadratisch afhankelijk

kenplaat $\Rightarrow U_{1n} \longrightarrow U_1 \leq U_{1n}$

# 2.13 Toerentalvariatie

## 2.13.3 Slip

### *2.13.3.1 Statorspanning*

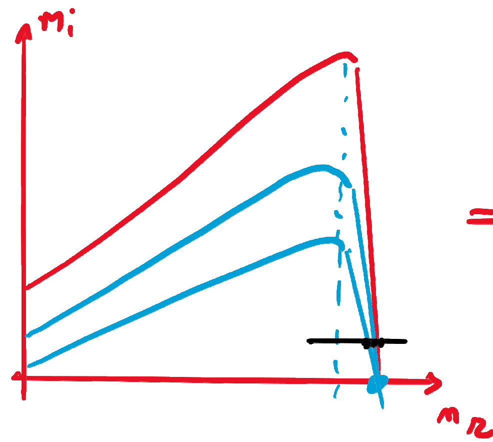
Nadeel ① $\Delta n_r <<<$

② $M_{T_1}$ ?? CONST

$M_{T_2} \sim n_r^2$

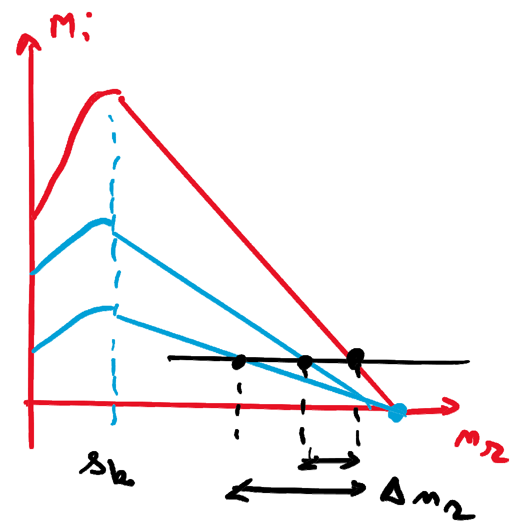
③ Regelgebied vergroten

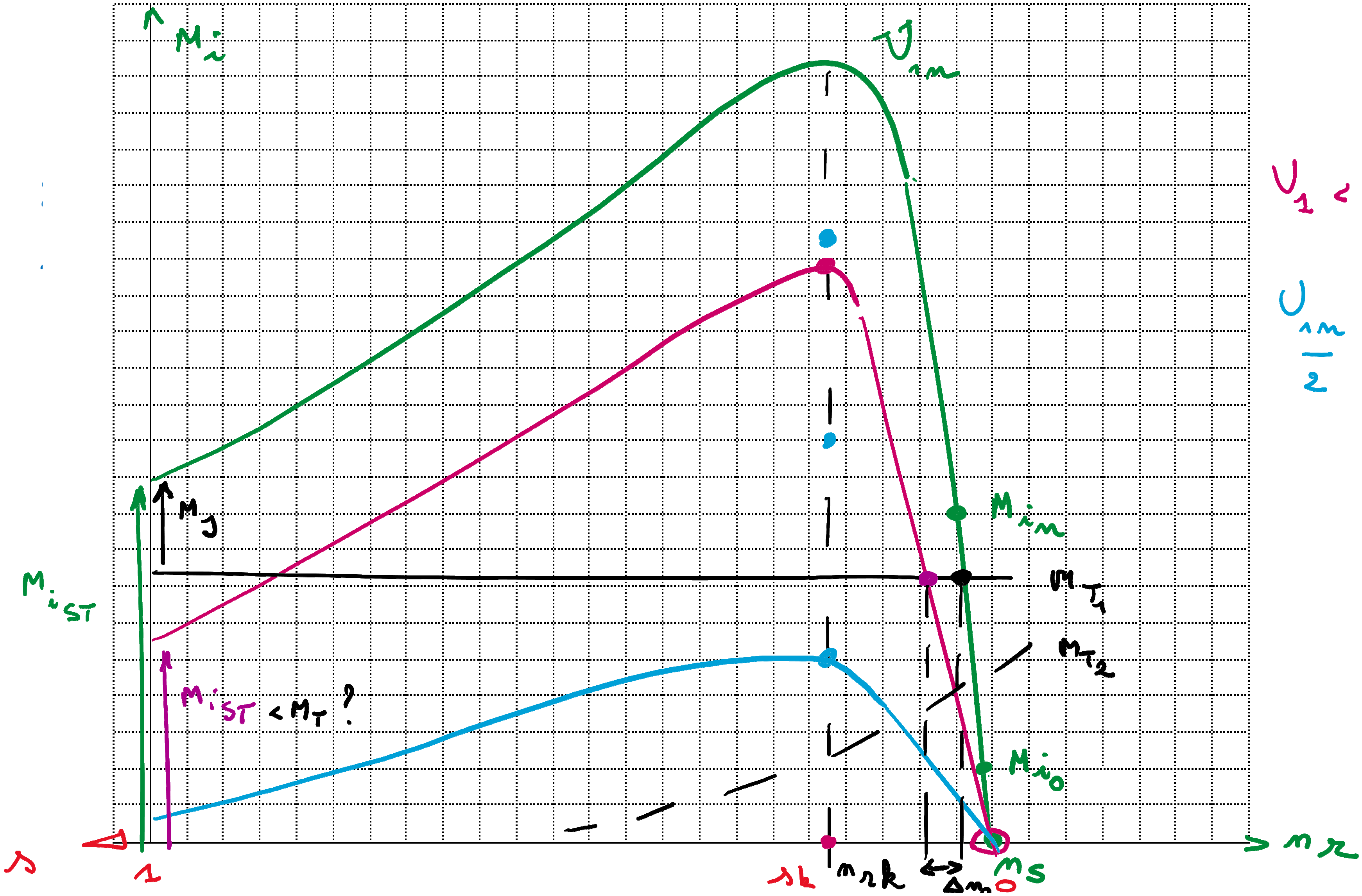
④ $M_T <<$




$\Longrightarrow$

$R_2 \uparrow\uparrow$






$U_1 < U_{1n}$

$\frac{U_{1n}}{2} \rightarrow \frac{M_{ik}}{4}$

$\hookrightarrow$ ?

# 2.13 Toerentalvariatie

$$M_k = \pm \frac{3}{\omega_s} \cdot \frac{U_1^2}{k^2} \cdot \frac{1}{2 \cdot X_{2,ST}}$$

## 2.13.3 Slip

### *2.13.3.2 Rotorweerstand*

1. $n_s = \frac{60 \cdot f_s}{p} \xrightarrow[\text{var}]{R_2}$ blijft gelijk

2. $R_2 \geq \underbrace{R_2}_{\text{voorzien}}$

3. S.M.

4. $s_k = \pm \frac{R_2}{X_{2ST}} \xrightarrow{R_2 \nearrow} s_k \nearrow \longrightarrow \overleftarrow{\text{LINKS}}$

5. $M_k$ ONAFH $R_2$ $\xrightarrow{R_2 \nearrow}$ $M_k =$ even groot

# 2.13 Toerentalvariatie

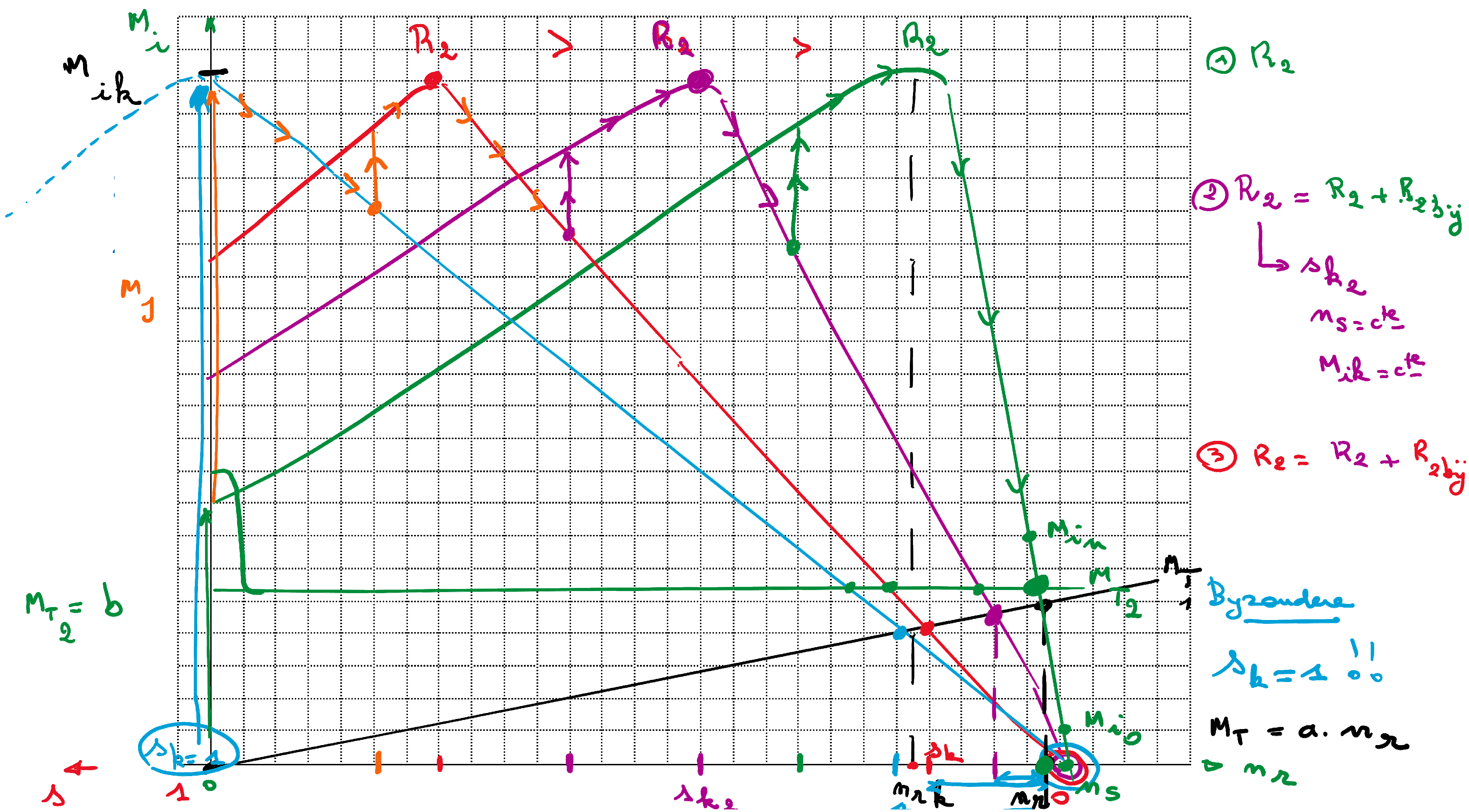
$$M_k = \pm \frac{3}{\omega_s} \cdot \frac{U_1^2}{k^2} \cdot \frac{1}{2 \cdot X_{2,ST}}$$

$$M_i = 3 \cdot \frac{R_2}{\omega_s} \cdot \frac{U_1^2}{k^2} \cdot \frac{s}{R_2^2 + s^2 \cdot X_{2,ST}^2}$$

## 2.13.3 Slip

### *2.13.3.2 Rotorweerstand*

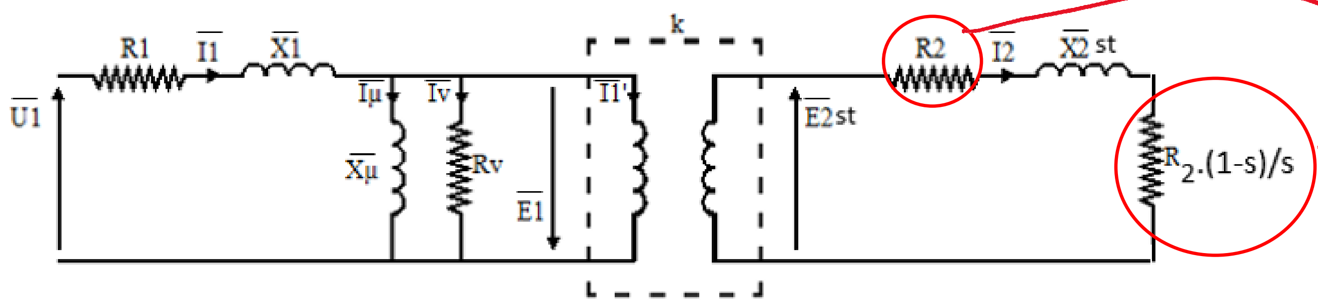
1. S.M
2. $R_2 \geq$ "$R_2$"
3. $\Delta m_r$
4. Aanloopproblematiek
   - $M_T > M_{iST}$
   - $M_{ik} \sim M_{iST}$
5. $M_J \simeq$ cte $\longrightarrow \alpha \simeq$ cte



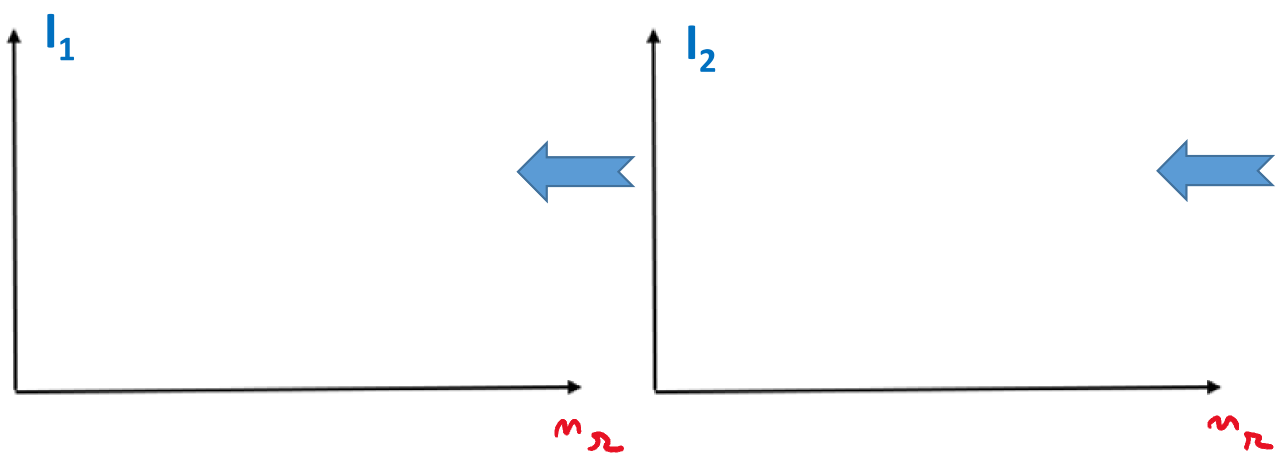
M_i
M_ik
M_J
M_T2 = b
s_k=1
s
1
0
R2
>
R2
>
R2
① R2
② R2 = R2 + R2bij
s_k2
n_s = cte
M_ik = cte
③ R2 = R2 + R2bij
M_in
M_T2
M_i0
Byzondere
s_k = 1 !!
M_T = a . n_r
n_r
n_s
s_k
n_rk
n_r0
s_k2

# 2.14 Stroom-toerentalkarakteristiek

$M_i = f(n_r)$

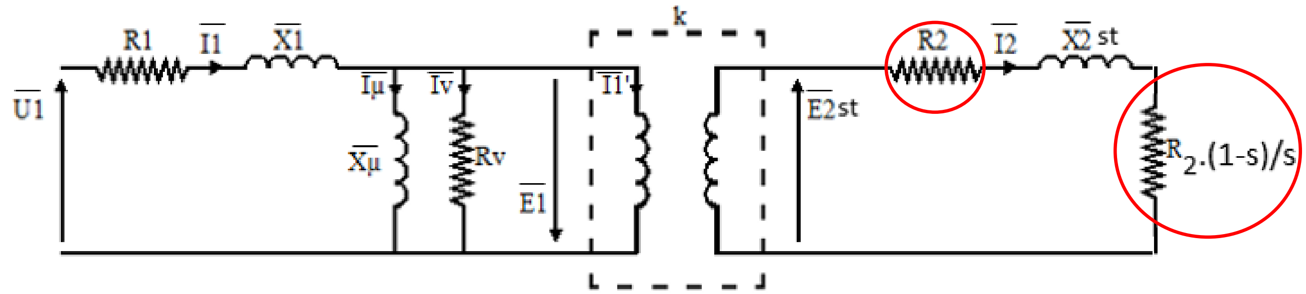



$$\frac{R_2}{s}$$




$$I_2 = \frac{E_{2st}}{\sqrt{\left(\frac{R_2}{s}\right)^2 + X_{2st}^2}}$$

# 2.14 Stroom-toerentalkarakteristiek




$$I_2 = \frac{E_{2,ST}}{\sqrt{\left(\frac{R_2}{s}\right)^2 + X_{2,ST}^2}}$$

## Bijzondere punten

Fysisch redeneren

① $s = 0 \longrightarrow n_r = n_s \longrightarrow I_2 = 0$

$n_{rel} = 0$

$E_2 = 0$

$$I_2 = \frac{E_{2ST}}{\sqrt{\left(\frac{R_2}{0}\right)^2 + X_{2ST}^2}} \simeq 0$$

② $s = 1 \longrightarrow n_r = 0 \longrightarrow I_{2ST}$

stilst

$s = -1$

$$I_{2ST} = \frac{E_{2ST}}{\sqrt{\left(\frac{R_2}{1}\right)^2 + X_{2ST}^2}} > 0$$

8, 7, 6, 5 $I_{2n}$

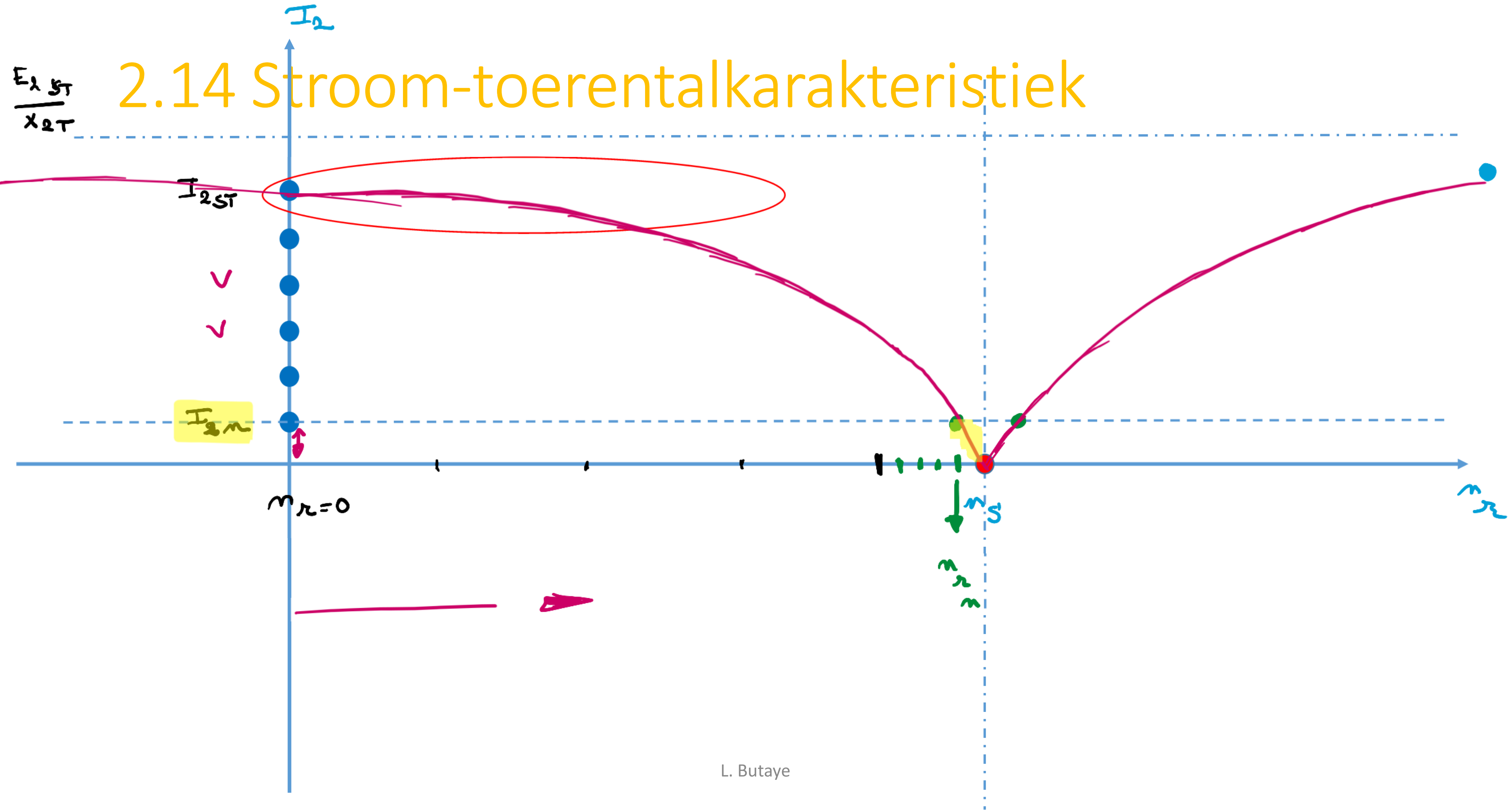
③ $s = s_n$ 0,04 0,05 0,07

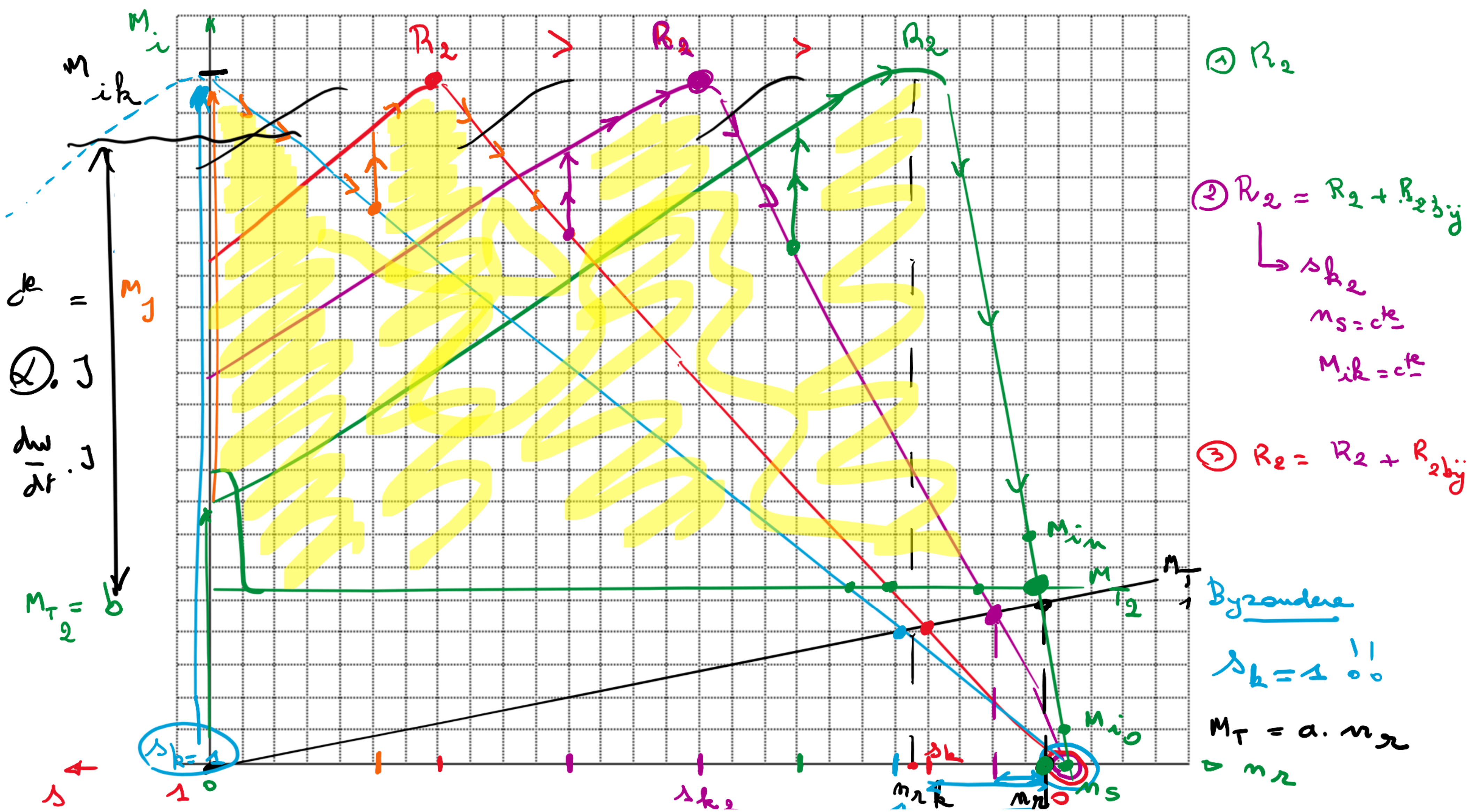
$$I_{2n} = \frac{E_{2ST}}{\sqrt{\left(\frac{R_2}{s_n}\right)^2 + X_{2ST}^2}} << I_{2ST}$$

④ $s \sim +\infty \longrightarrow I_2 \approx \frac{E_{2ST}}{X_{2ST}}$

Butaye

# 2.14 Stroom-toerentalkarakteristiek





M_i
M_ik
R2
>
R2
>
R2
① R2
② R2 = R2 + R2bij
sk2
ns = cte
Mik = cte
③ R2 = R2 + R2bij
cte = ②. J
dw/dt . J
MJ
MT2 = b
Mi1
MT2
MJ
Byzondere
sk = 1 !!
Mi0
MT = a. nr
nr
ns
sk
nrk
nr0
sk2
sk = 1
s
1
0