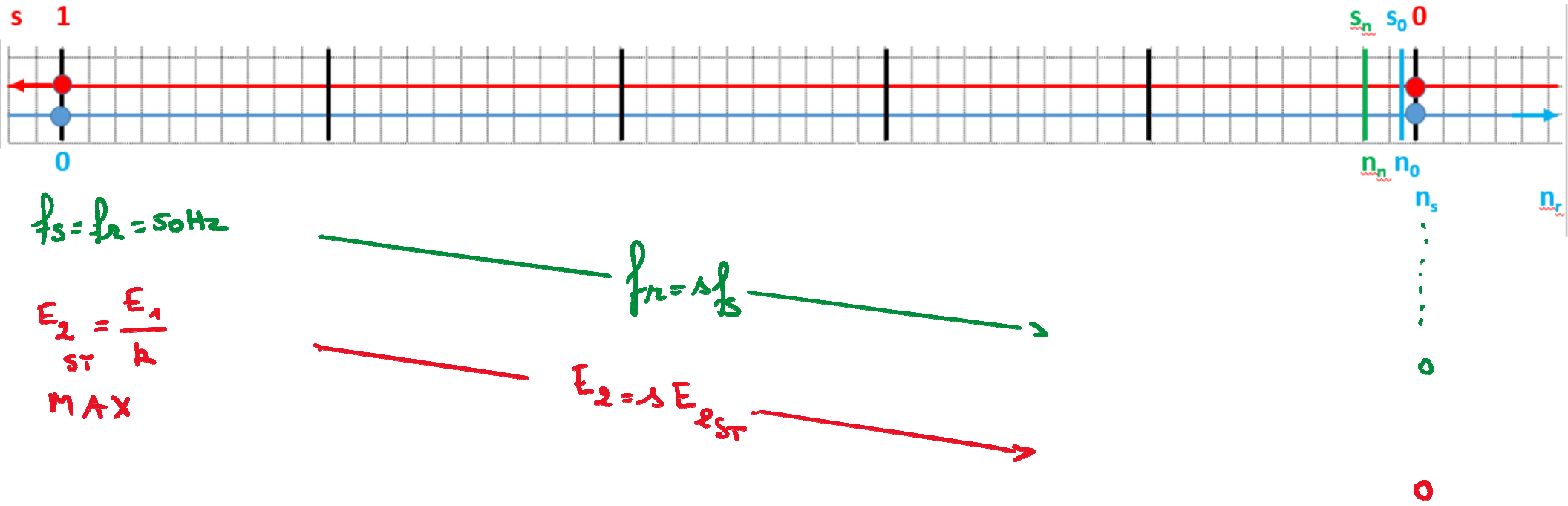
2.7 Frequentieafhankelijke rotorgrootheden

2.7.2. Rotoremk



2.7 Frequentieafhankelijke rotorgrootheden

2.7.3. Rotorreactantie

X_2 ~ rotor lekflux

STILSTAND $X_{2ST} = \omega_s L_2 = \frac{2\pi f_s}{\tau} \cdot L_2 \Rightarrow X_{2ST}$ MAX

$\omega_s = \frac{2\pi}{60} \cdot n_s = \frac{2\pi}{60} \cdot \frac{60 \cdot f_s}{\tau} = \frac{2\pi f_s}{\tau}$

2.7 Frequentieafhankelijke rotorgrootheden

2.7.3. Rotorreactantie

DRAAIEN VARIABELE X_2

↳ $n_r \rightarrow \dots \rightarrow f$

! $X_2 = \frac{2\pi}{60} \cdot \frac{f_r}{p} \cdot L_2$

VAR

$= \frac{2\pi}{60} \cdot \frac{s f_s}{p} \cdot L_2$

$= s \cdot X_{2ST}$

$0 \dots 1$ MAX

oef 2 polig $p = 1 \rightarrow \dots$

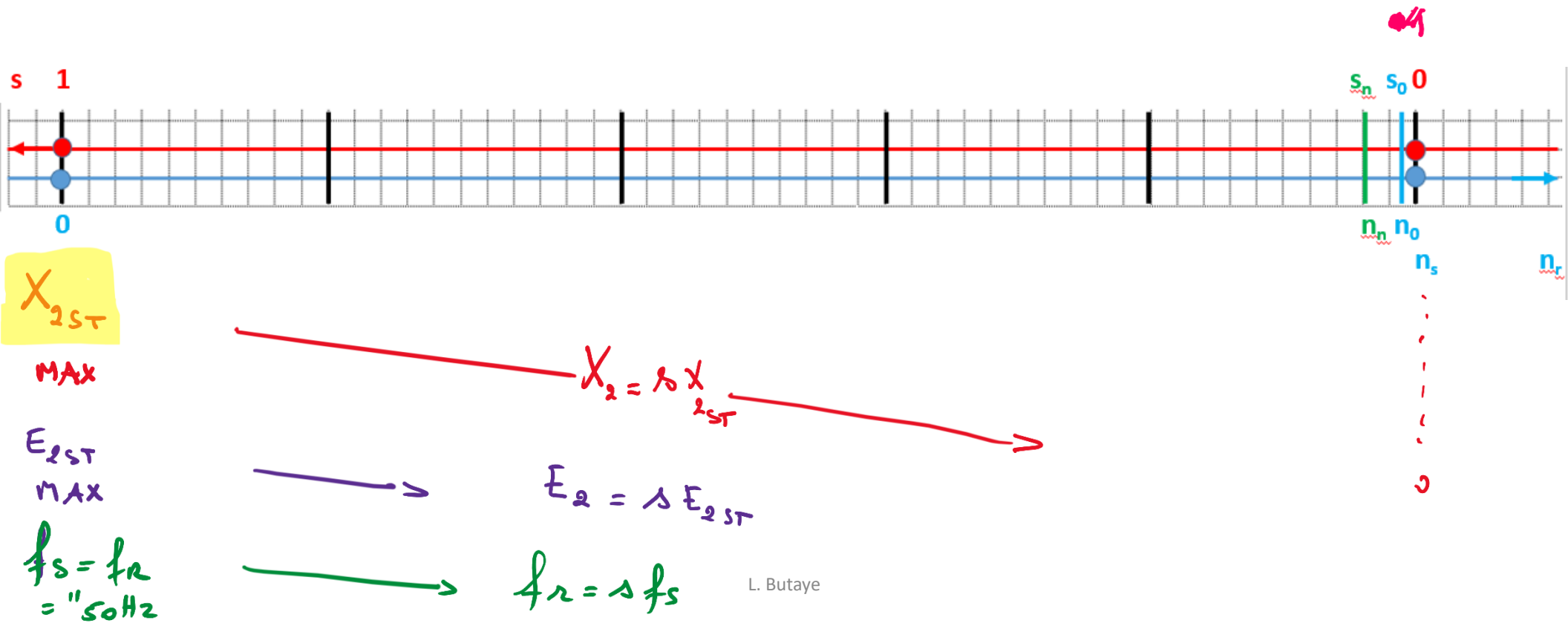
4 → p=2

6 3

8 4

2.7 Frequentieafhankelijke rotorgrootheden

2.7.3. Rotorreactantie



2.7 Frequentieafhankelijke rotorgrootheden

2.7.4. Rotorimpedantie

STILSTAND

$$Z_{2ST} = \sqrt{R_2^2 + X_{2ST}^2}$$

X_{2ST} MAX ⇒ meest inductieve imp.

$$\overline{Z}_{2ST} = R_2 + \overline{X_{2ST}}$$

↳ cos φ_{2ST}

Rotorstroom

$$I_{2ST} = \frac{E_{2ST} \rightarrow MAX}{Z_{2ST} \rightarrow MEEST\ IND}$$

↳ { GROOTST
meest inductief

NOMINAAL

$$Z_2 = \sqrt{R_2^2 + X_2^2}$$

VAR afh. toerental

$n_r \uparrow \rightarrow$ Z_2 steeds meer ohms worden

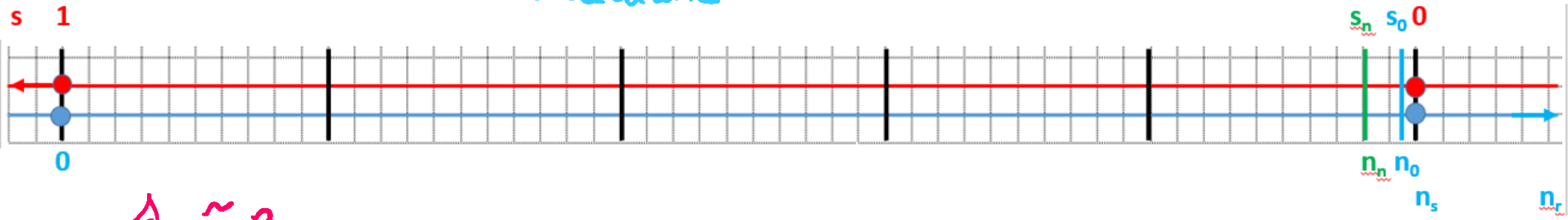
↳ cos φ_2

$$I_2 \text{ VAR} = \frac{E_2 \downarrow\downarrow}{Z_2}$$

{ $I_2 \downarrow\downarrow$
meer ohms ....

2.8 Equivalent schema niet ideale ASM

2.8.1. Nullast → $P_v <$ wijziging verliezen



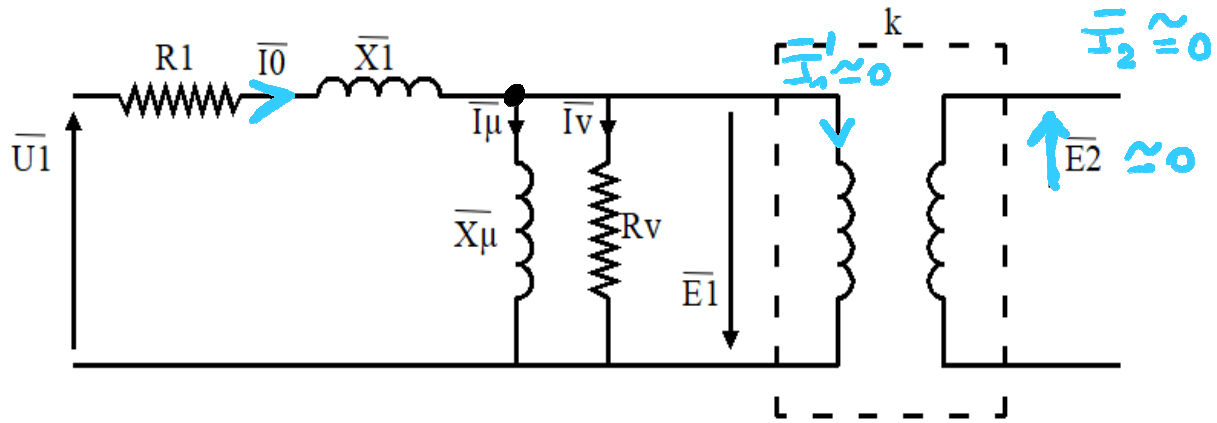
$s_0 \simeq 0$

$E_2 = s \cdot E_{2ST} \approx 0$ (s is 0)

$I_2 \approx 0 \rightarrow I_1' \approx 0 \Rightarrow I_0$!!

2.8 Equivalent schema niet ideale ASM

2.8.1. Nullast



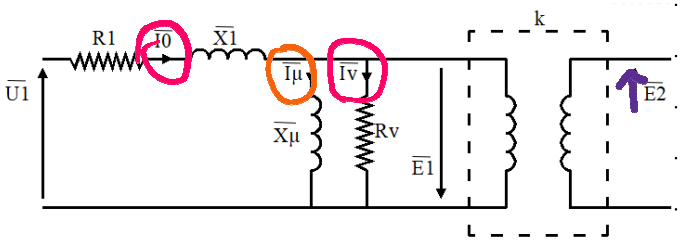
SP. VGL STATOR

$$\bar{U}_1 = -\bar{E}_1 + R_1 \bar{I}_0 + \bar{X}_1 \bar{I}_0$$

STR. VGL STATOR

$$\bar{I}_0 = \bar{I}_\mu + \bar{I}_v$$

>> ...



2.8.1. Nullast

① $\bar{E}_1$ → $-90°$

② Φ → $0°$

③ $\bar{I}_\mu$ HOPKINSON

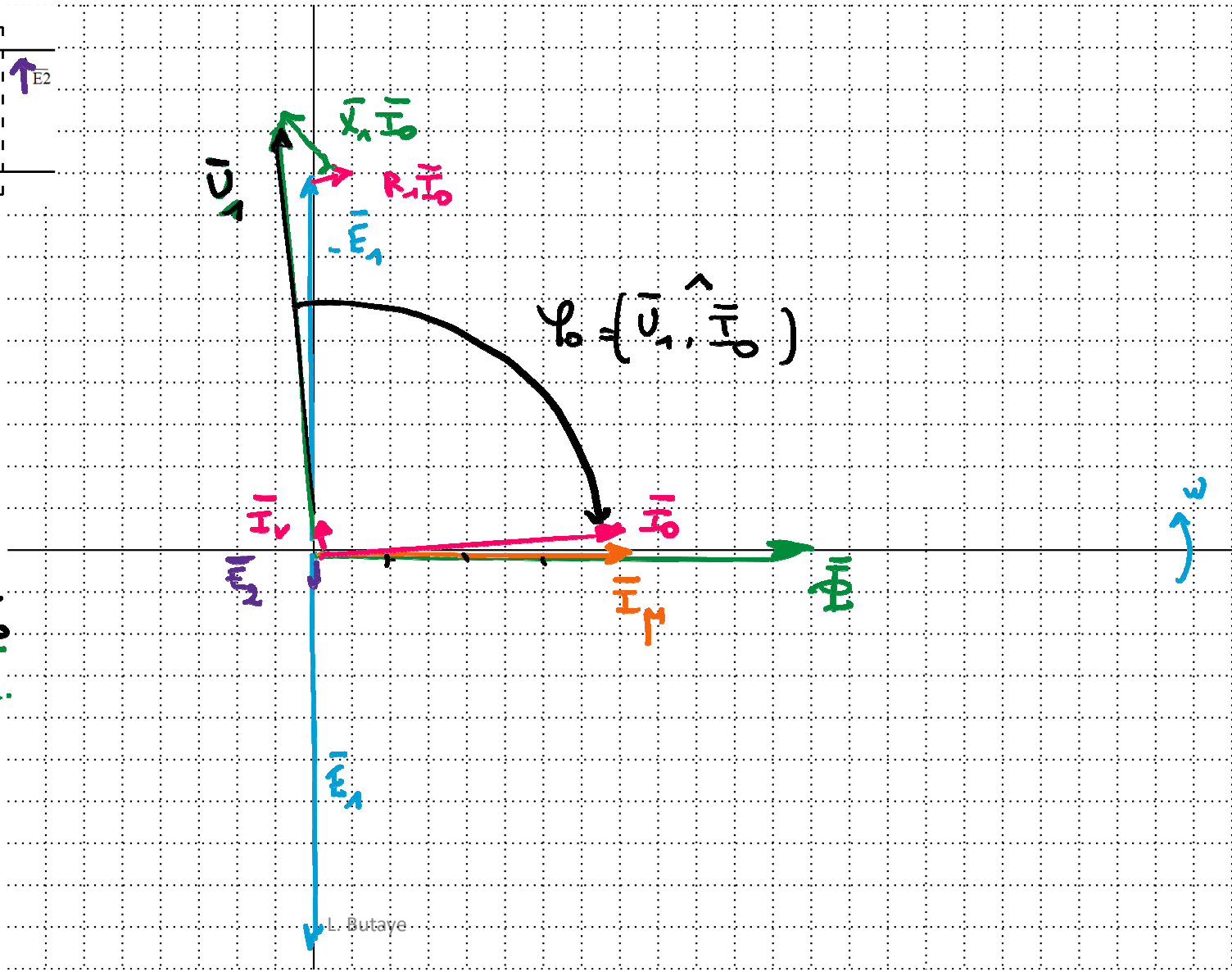
④ $\bar{I}_v$

⑤ $\bar{U}_1 = -\bar{E}_1 + R_1\bar{I}_0 + \bar{X}_1\bar{I}_0$

NULLAST

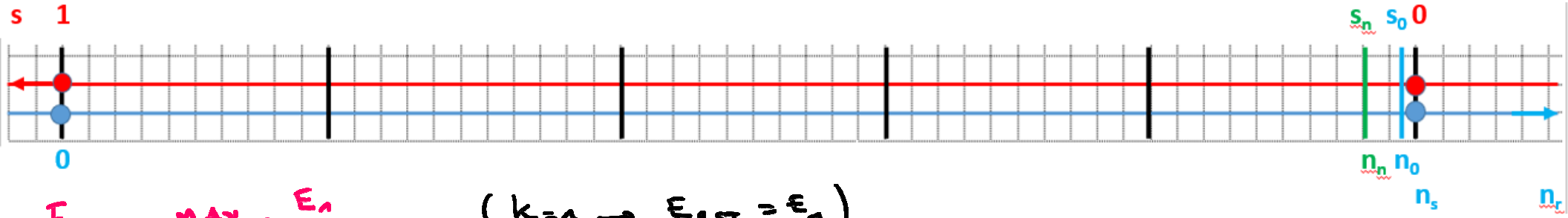
φ_0

$|\bar{I}_0| >> \ldots$



2.8 Equivalent schema niet ideale ASM

2.8.2. Rotorstilstand



$E_{2ST} = MAX = \frac{E_n}{k}$ $\quad (k=a \rightarrow E_{2ST} = E_n)$

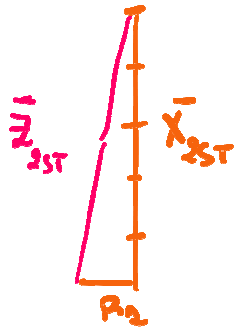
$X_{2ST} = MAX = \begin{matrix} 4 \\ 5,5 \\ \textcircled{5} \\ 5,5 \\ 6 \end{matrix} \cdot R_2 \Rightarrow (X_{2ST} = 5R_2)$

$\Rightarrow \bar{Z}_{2ST} = R_2 + \bar{X}_{2ST}$

$\varphi_{2ST} = MEEST \ IND$

$\operatorname{bgtg} \frac{X_{2ST}}{R_2} = \operatorname{bgtg} \frac{5R_2}{R_2} = \operatorname{bgtg} 5$

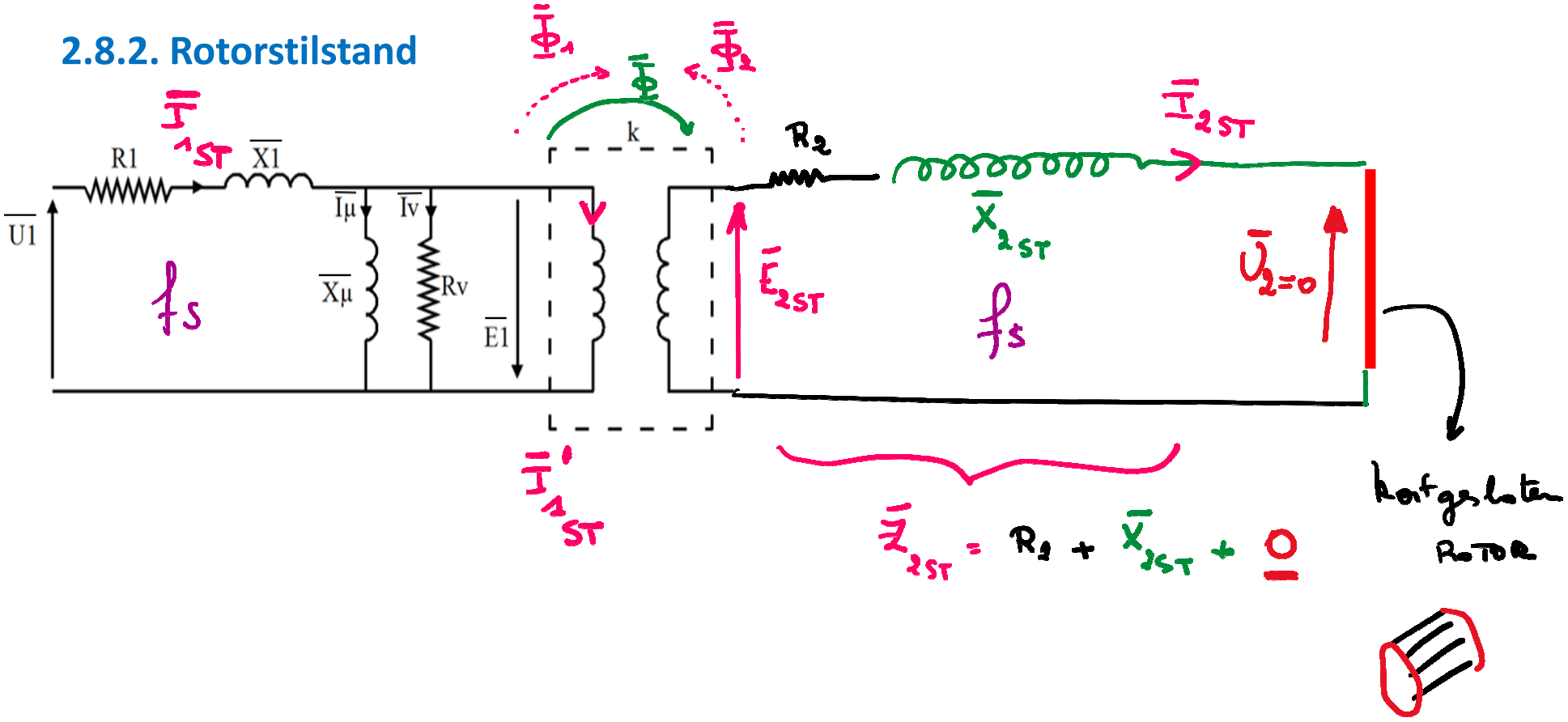
$= 79°$



$I_{2ST} \gg \longrightarrow I'_{1ST} \gg \longrightarrow \bar{I}_{1ST} = \bar{I}_0 + \bar{I}'_{1ST}$

2.8 Equivalent schema niet ideale ASM

2.8.2. Rotorstilstand



2.8 Equivalent schema niet ideale ASM

2.8.2. Rotorstilstand

ROTOR SP VGL

$$\bar{E}_{2ST} = R_2 \bar{I}_{2ST} + \bar{X}_{2ST} \cdot \bar{I}_{2ST} + 0$$

$$\frac{\bar{E}_1}{\bar{E}_{2ST}} = k$$

STATOR SP.VGL

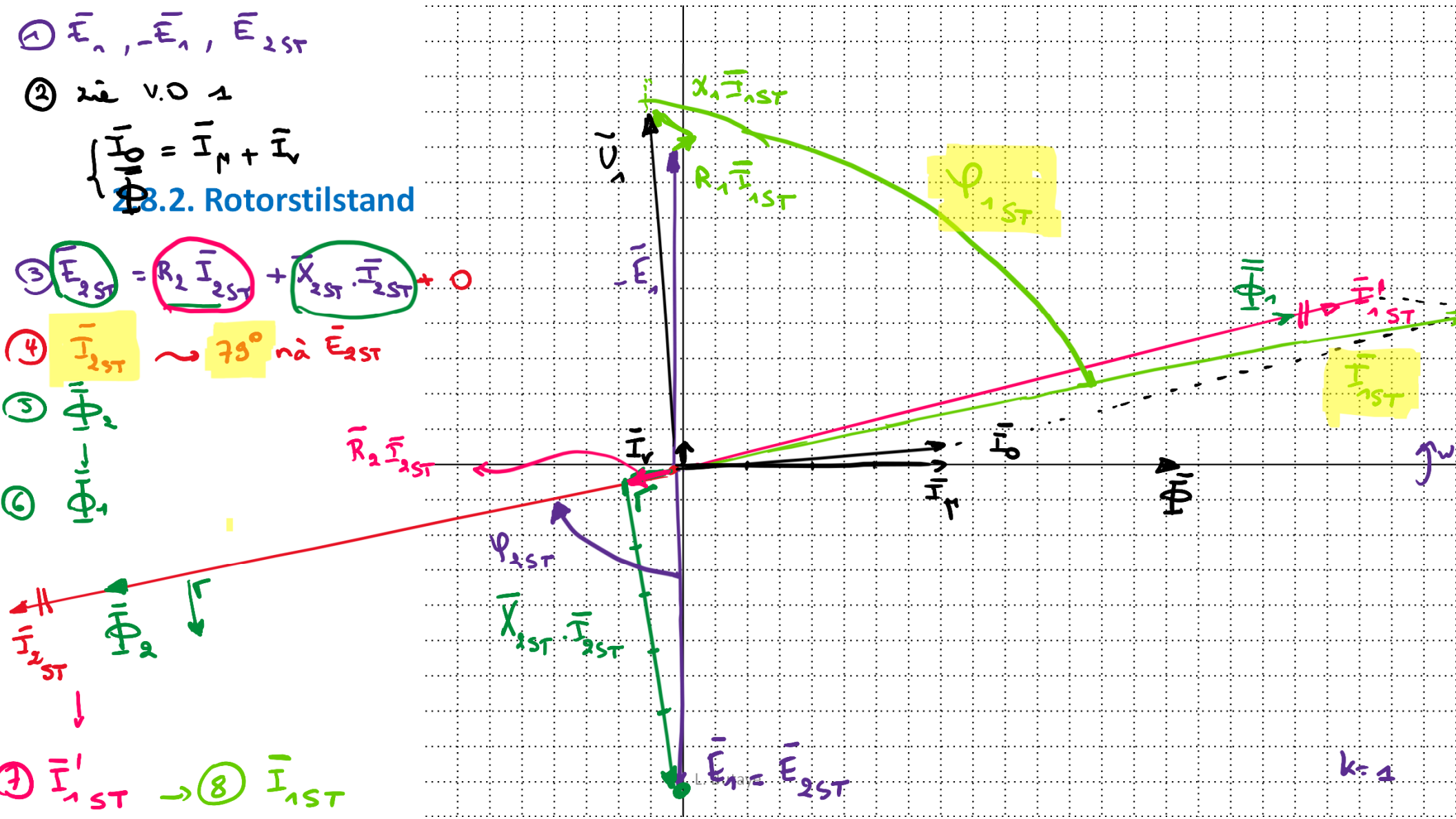
$$\bar{U}_1 = -\bar{E}_1 + R_1 \bar{I}_{1ST} + \bar{X}_1 \cdot \bar{I}_{1ST}$$

STROMEN

$$\bar{I}_0 = \bar{I}_M + \bar{I}_V \quad \text{(zie VD 4)}$$

$$\bar{I}_{1ST} = \bar{I}_0 + \bar{I}'_{1ST} = \bar{I}_0 + \left(-\frac{\bar{I}_{2ST}}{k}\right)$$

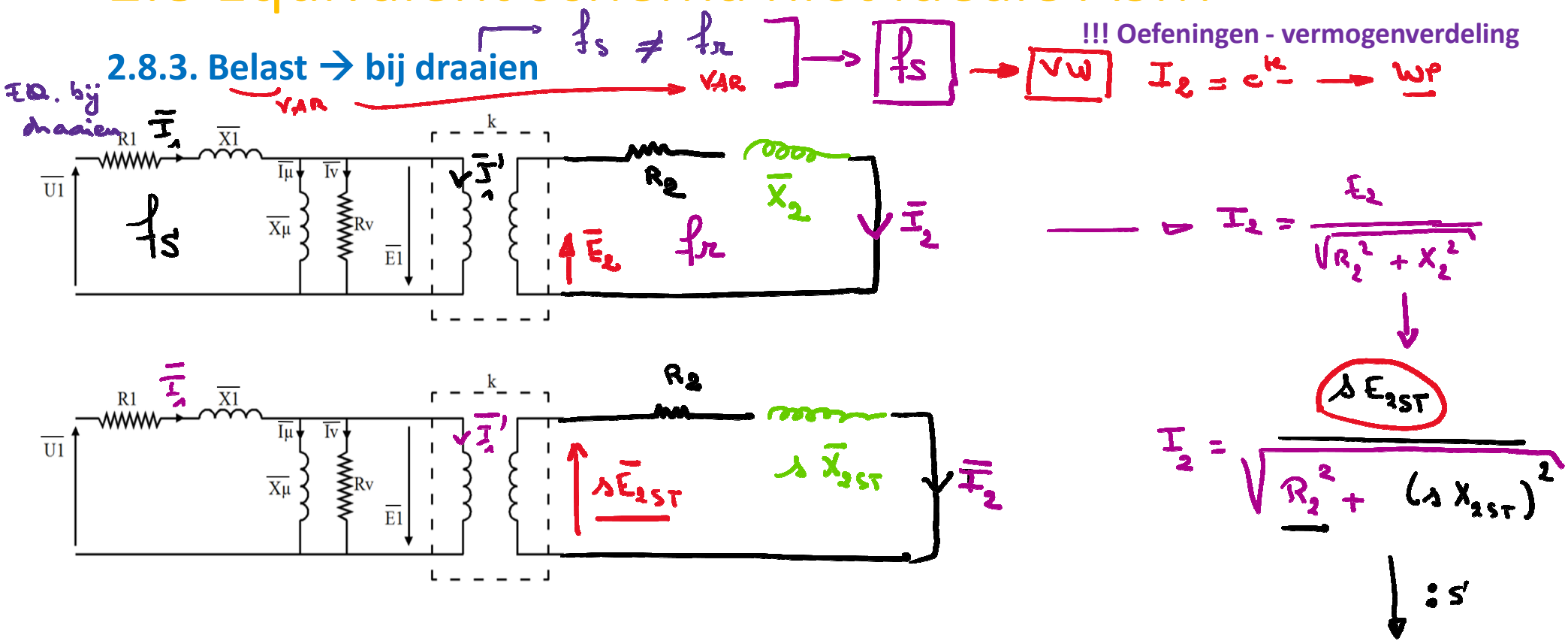
2.8.2. Rotorstilstand



2.8 Equivalent schema niet ideale ASM

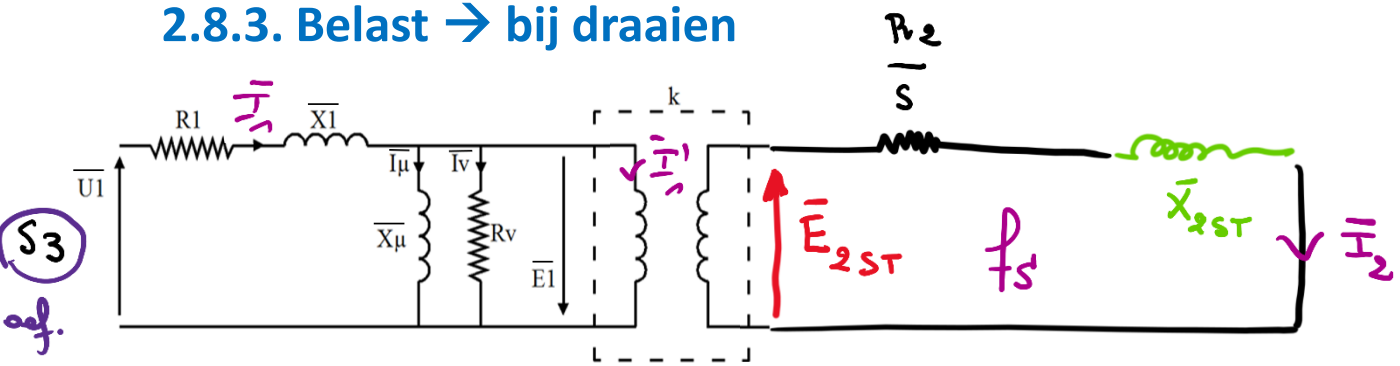
2.8.3. Belast → bij draaien

!!! Oefeningen - vermogenverdeling

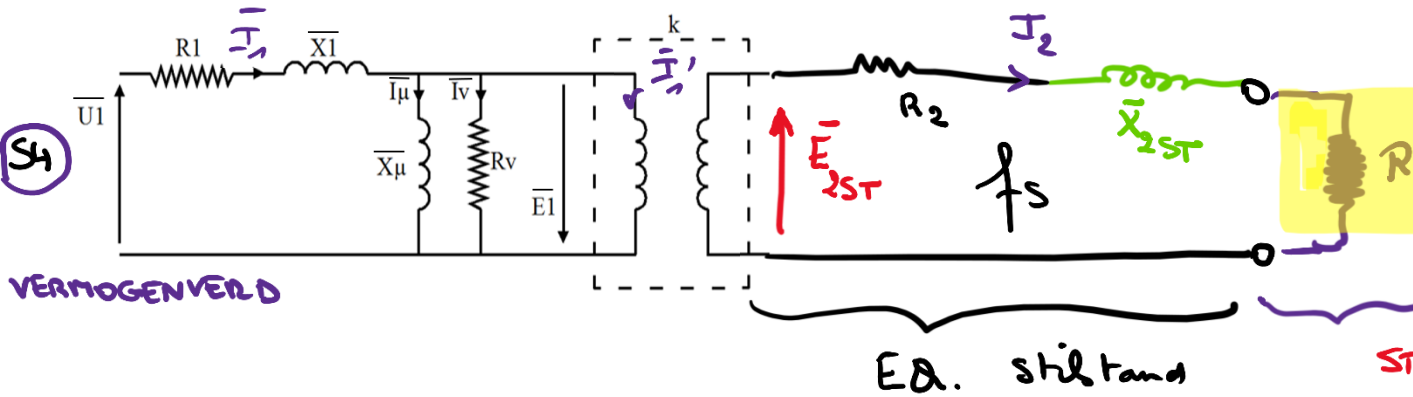


2.8 Equivalent schema niet ideale ASM

2.8.3. Belast → bij draaien



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



$$R_b = \frac{R_2}{s} - R_2$$

$$R_b = \frac{1-s}{s} \cdot R_2$$

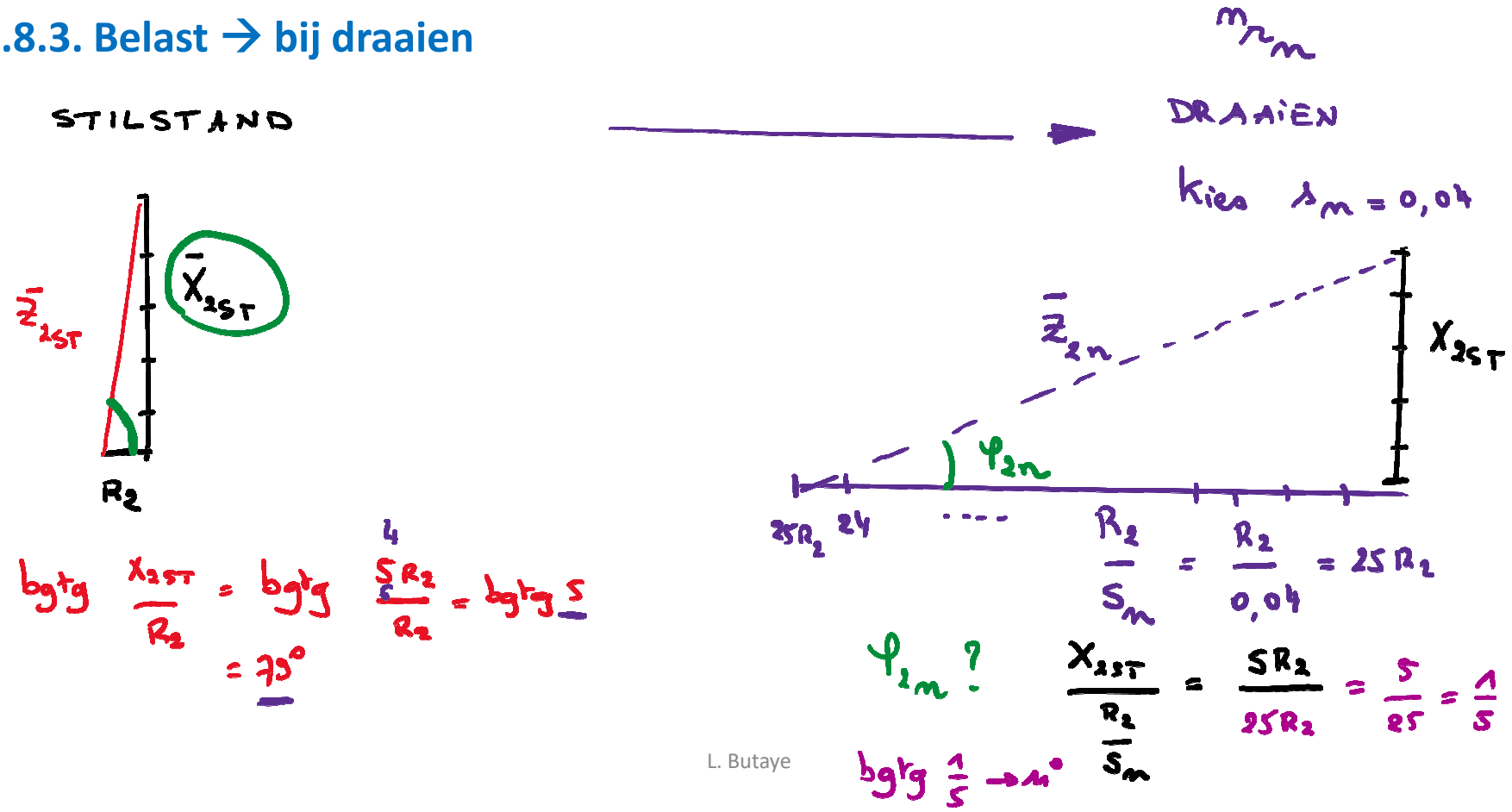
Byz. pt =

START — KORTSL — $R_b = \frac{1-1}{1} \cdot R_2 = 0$

$n_r = n_s$ — open keten — $R_b = \frac{1-0}{1} \cdot R_2 = \infty$

2.8 Equivalent schema niet ideale ASM

2.8.3. Belast → bij draaien



① $-\bar{E}_1$, $\bar{E}_1$, $\bar{E}_{2ST}$ (vd 1/2)
$\bar{I}_0$ zur vd 1/2
$\bar{\Phi}$

② $\bar{I}_{2,m}$.

③ $\bar{E}_{2ST} = \frac{R_2}{s}\bar{I}_{2m} + \bar{X}_{2ST}\cdot\bar{I}_{2,m}$

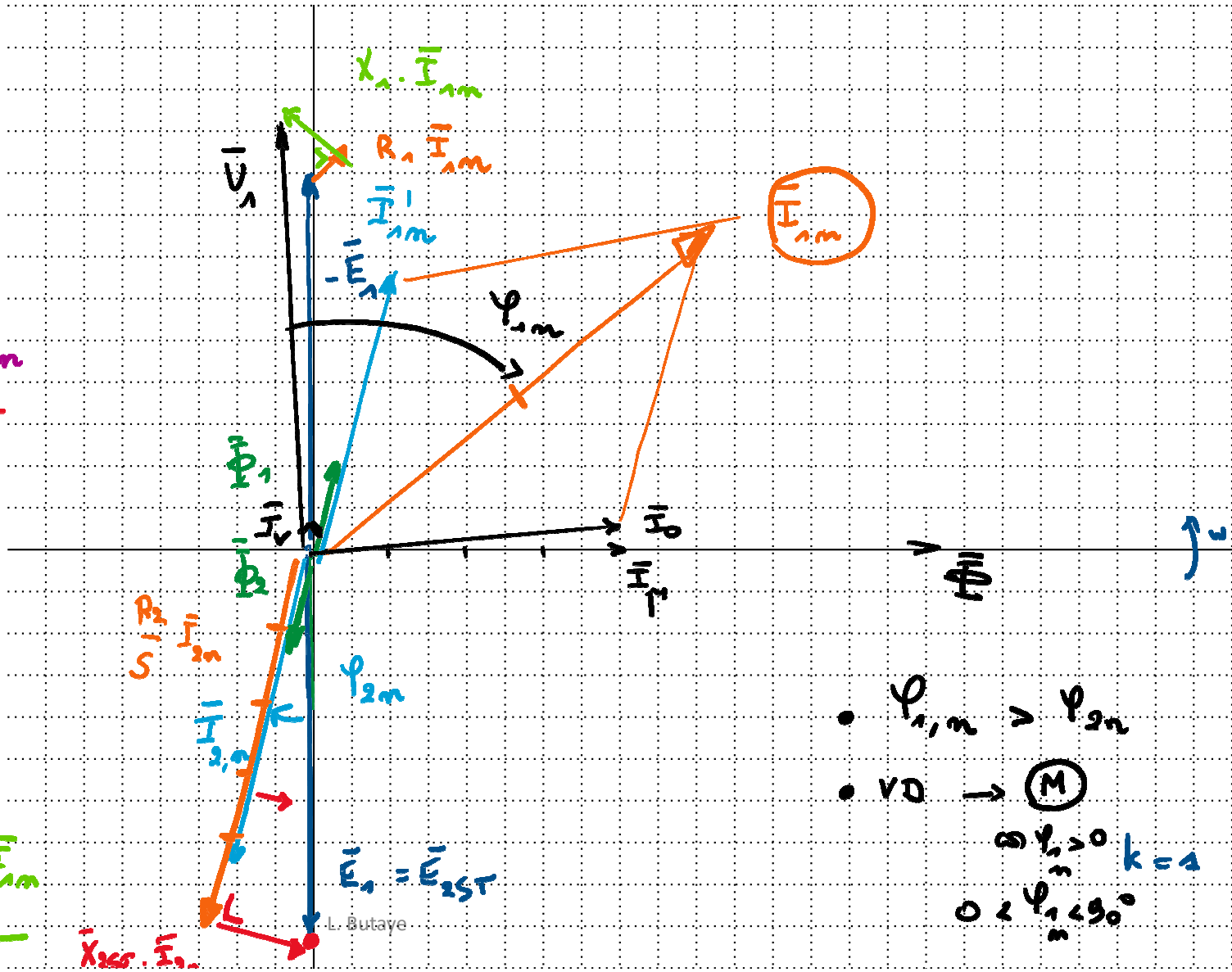
④ $\bar{\Phi}_2$

⑤ $\bar{\Phi}_1 = -\bar{\Phi}_2$

⑥ $\bar{I}'_{1m}$.

⑦ $\bar{I}_{1m} = \bar{I}_0 + \bar{I}'_{1,m}$

⑧ $\bar{U}_1 = -\bar{E}_1 + R_1\bar{I}_{1m} + \bar{X}_1\bar{I}_{1m}$



- $\varphi_{1,m} > \varphi_{2m}$
- vd → (M) $\Leftrightarrow \varphi_{1,m} > 0$ $k = 1$
  $0 < \varphi_{1,m} < 90°$