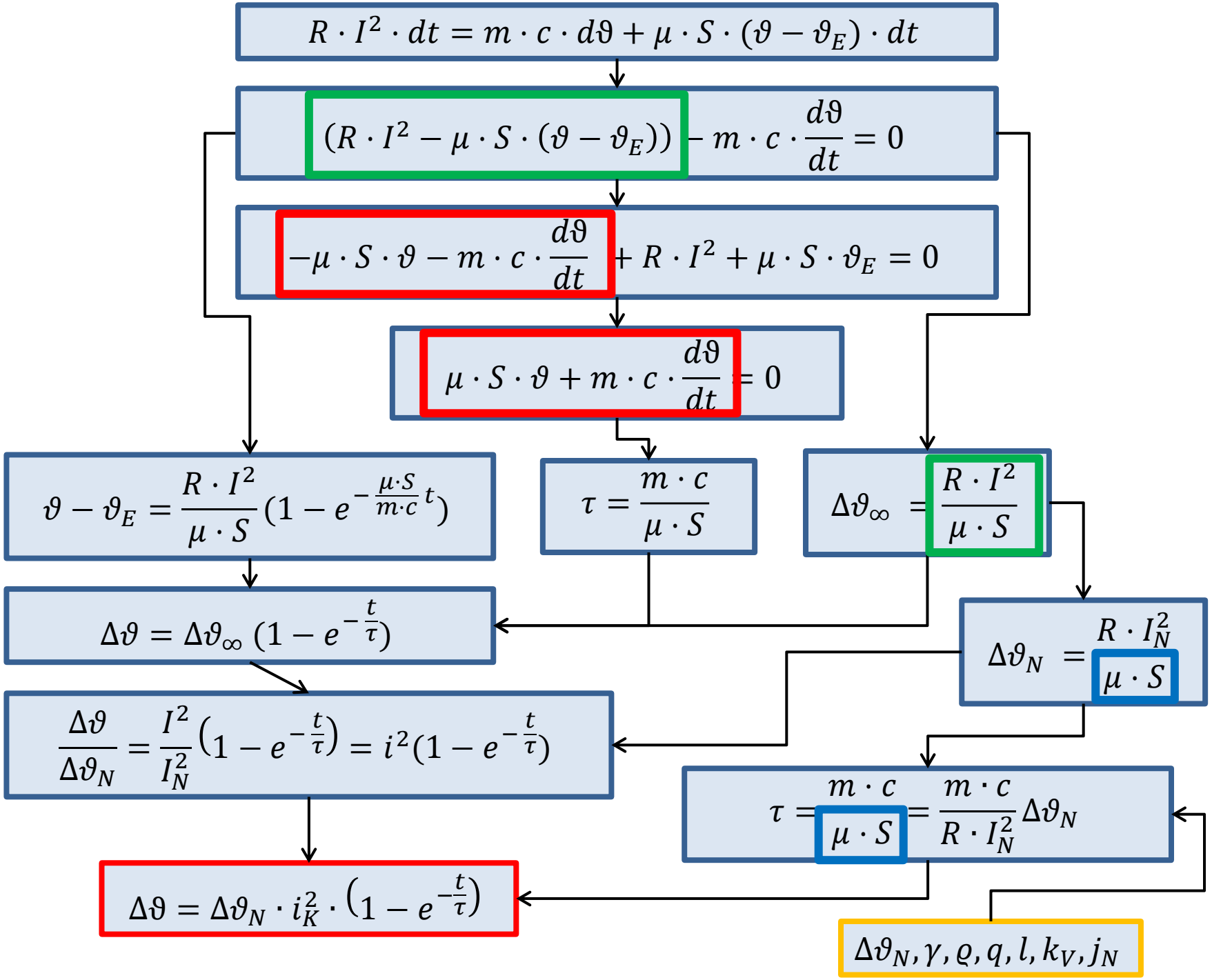
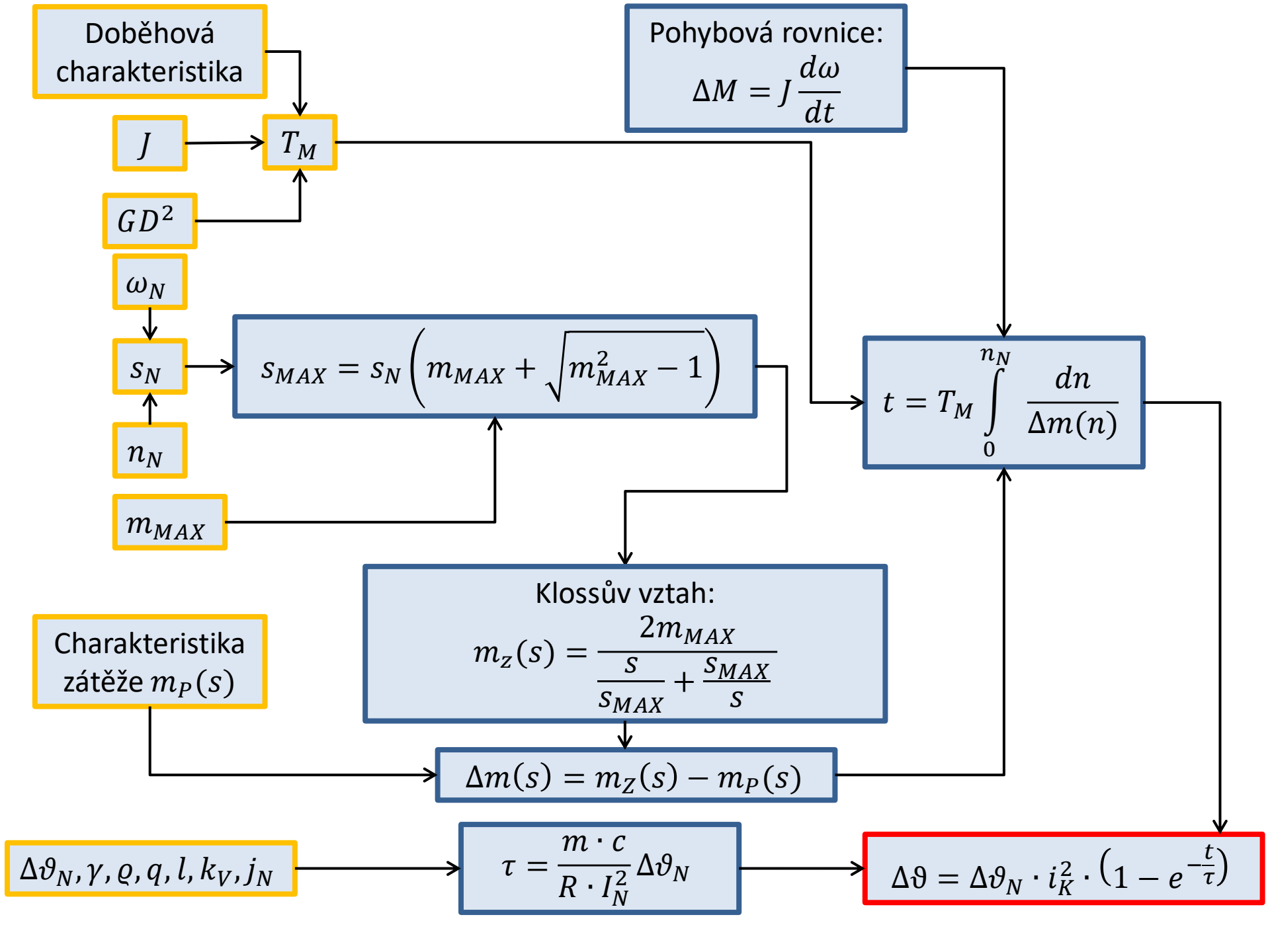
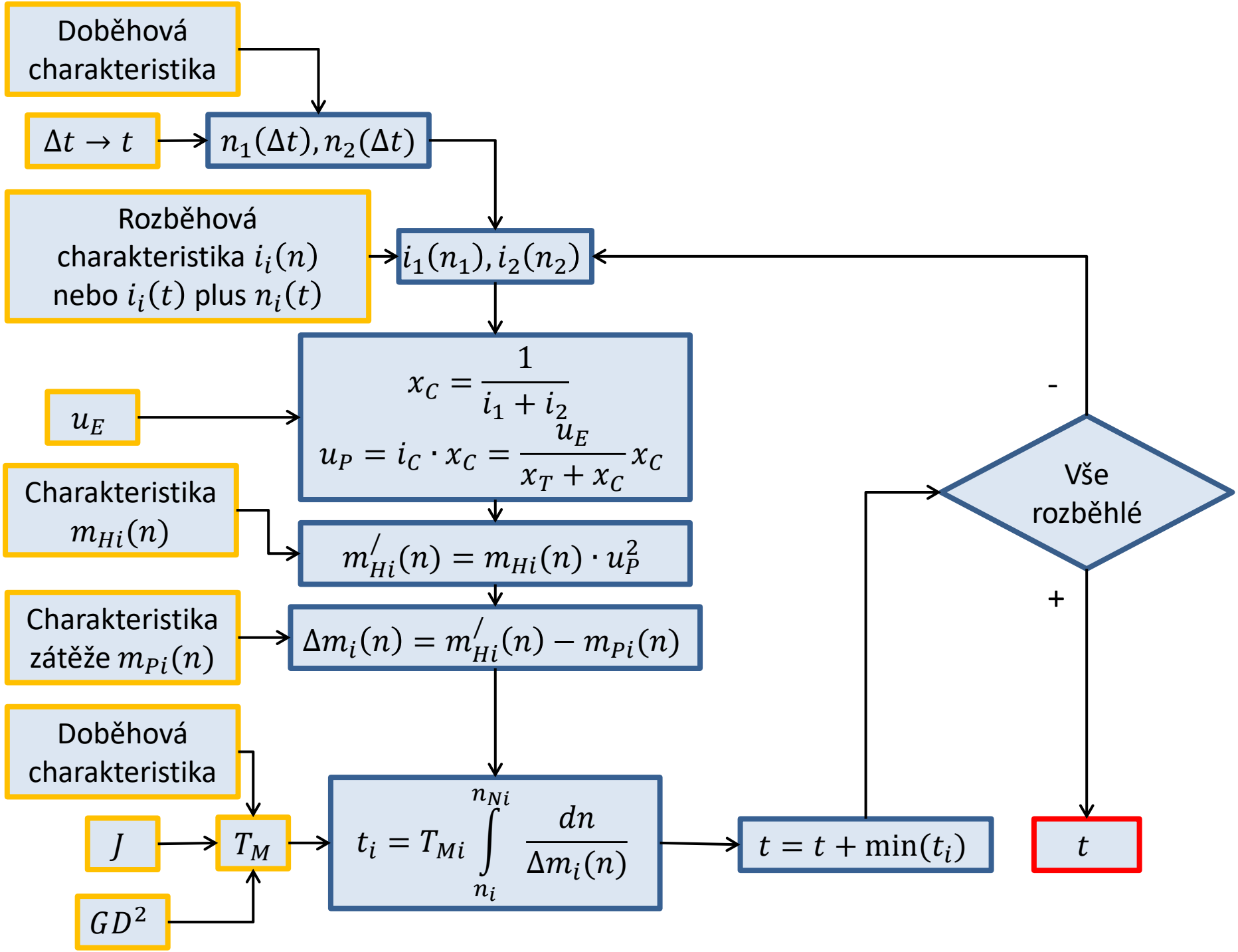
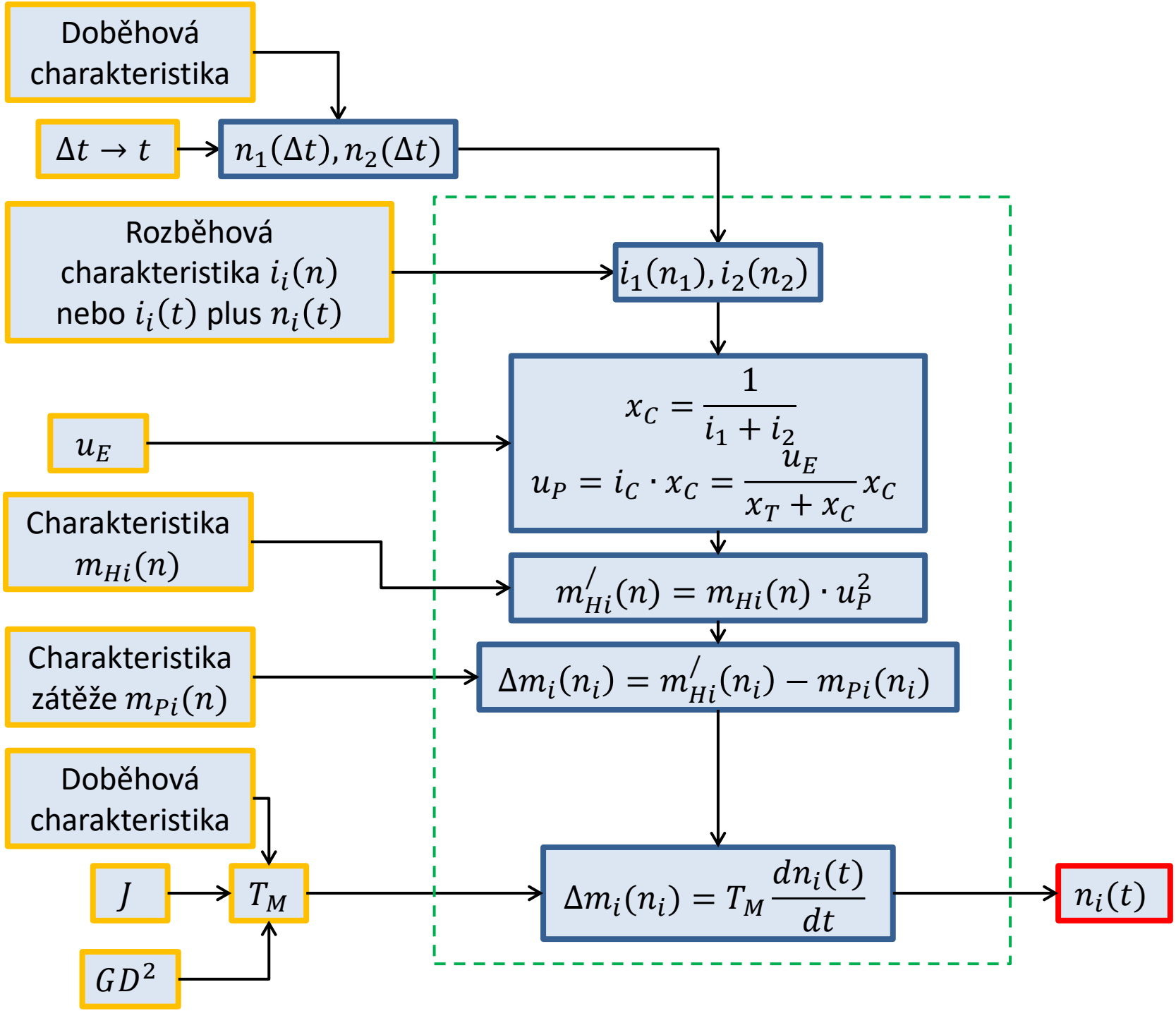
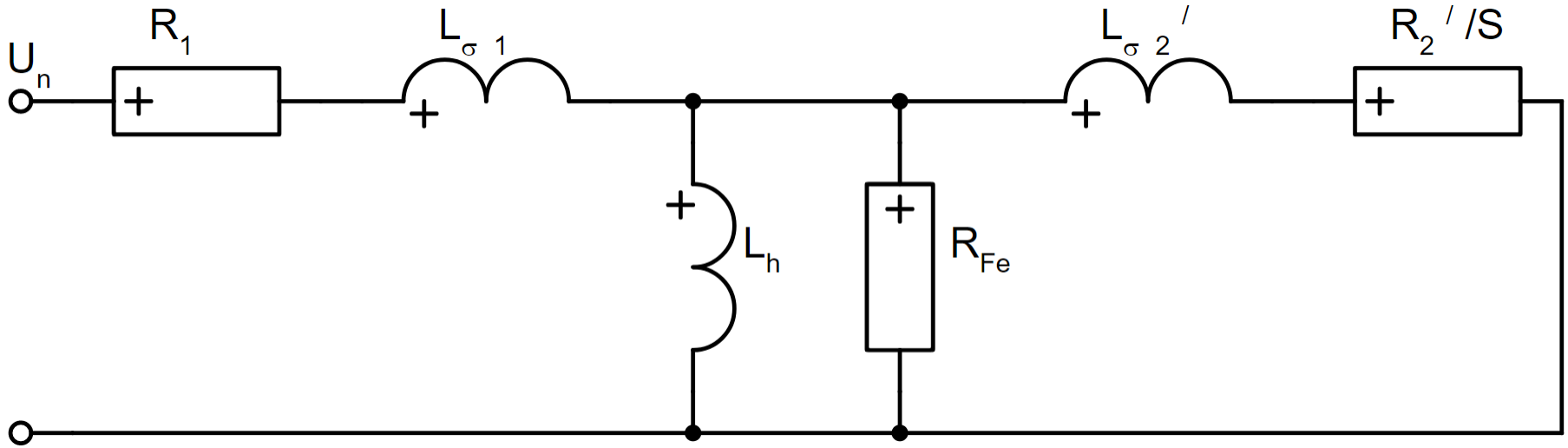

$R \cdot I^2 \cdot dt = m \cdot c \cdot d\vartheta + \mu \cdot S \cdot (\vartheta - \vartheta_E) \cdot dt$
$(R \cdot I^2 - \mu \cdot S \cdot (\vartheta - \vartheta_E)) - m \cdot c \cdot \frac{d\vartheta}{dt} = 0$
$-\mu \cdot S \cdot \vartheta - m \cdot c \cdot \frac{d\vartheta}{dt} + R \cdot I^2 + \mu \cdot S \cdot \vartheta_E = 0$
$\mu \cdot S \cdot \vartheta + m \cdot c \cdot \frac{d\vartheta}{dt} = 0$
$\vartheta - \vartheta_E = \frac{R \cdot I^2}{\mu \cdot S}(1 - e^{-\frac{\mu \cdot S}{m \cdot c} t})$
$\tau = \frac{m \cdot c}{\mu \cdot S}$
$\Delta\vartheta_\infty = \frac{R \cdot I^2}{\mu \cdot S}$
$\Delta\vartheta = \Delta\vartheta_\infty (1 - e^{-\frac{t}{\tau}})$
$\Delta\vartheta_N = \frac{R \cdot I_N^2}{\mu \cdot S}$
$\frac{\Delta\vartheta}{\Delta\vartheta_N} = \frac{I^2}{I_N^2}(1 - e^{-\frac{t}{\tau}}) = i^2(1 - e^{-\frac{t}{\tau}})$
$\tau = \frac{m \cdot c}{\mu \cdot S} = \frac{m \cdot c}{R \cdot I_N^2} \Delta\vartheta_N$
$\Delta\vartheta = \Delta\vartheta_N \cdot i_K^2 \cdot (1 - e^{-\frac{t}{\tau}})$
$\Delta\vartheta_N, \gamma, \varrho, q, l, k_V, j_N$


Doběhová charakteristika
J
GD^2
ω_N
s_N
n_N
m_{MAX}
T_M
$s_{MAX} = s_N\left(m_{MAX} + \sqrt{m_{MAX}^2 - 1}\right)$
Pohybová rovnice:
$\Delta M = J\frac{d\omega}{dt}$
$t = T_M \int_0^{n_N} \frac{dn}{\Delta m(n)}$
Klossův vztah:
$m_z(s) = \frac{2m_{MAX}}{\frac{s}{s_{MAX}} + \frac{s_{MAX}}{s}}$
Charakteristika zátěže $m_P(s)$
$\Delta m(s) = m_Z(s) - m_P(s)$
$\Delta\vartheta_N, \gamma, \varrho, q, l, k_V, j_N$
$\tau = \frac{m \cdot c}{R \cdot I_N^2}\Delta\vartheta_N$
$\Delta\vartheta = \Delta\vartheta_N \cdot i_K^2 \cdot \left(1 - e^{-\frac{t}{\tau}}\right)$


Doběhová charakteristika
$\Delta t \rightarrow t$
$n_1(\Delta t), n_2(\Delta t)$
Rozběhová charakteristika $i_i(n)$ nebo $i_i(t)$ plus $n_i(t)$
$i_1(n_1), i_2(n_2)$
u_E
$x_C = \frac{1}{i_1 + i_2}$
$u_P = i_C \cdot x_C = \frac{u_E}{x_T + x_C} x_C$
Charakteristika $m_{Hi}(n)$
$m'_{Hi}(n) = m_{Hi}(n) \cdot u_P^2$
Charakteristika zátěže $m_{Pi}(n)$
$\Delta m_i(n) = m'_{Hi}(n) - m_{Pi}(n)$
Doběhová charakteristika
J
T_M
GD^2
$t_i = T_{Mi} \int_{n_i}^{n_{Ni}} \frac{dn}{\Delta m_i(n)}$
$t = t + \min(t_i)$
Vše rozběhlé
-
+
t


Doběhová charakteristika
$\Delta t \rightarrow t$
$n_1(\Delta t), n_2(\Delta t)$
Rozběhová charakteristika $i_i(n)$ nebo $i_i(t)$ plus $n_i(t)$
$i_1(n_1), i_2(n_2)$
u_E
$x_C = \frac{1}{i_1 + i_2}$
$u_P = i_C \cdot x_C = \frac{u_E}{x_T + x_C} x_C$
Charakteristika $m_{Hi}(n)$
$m'_{Hi}(n) = m_{Hi}(n) \cdot u_P^2$
Charakteristika zátěže $m_{Pi}(n)$
$\Delta m_i(n_i) = m'_{Hi}(n_i) - m_{Pi}(n_i)$
Doběhová charakteristika
J
T_M
GD^2
$\Delta m_i(n_i) = T_M \frac{dn_i(t)}{dt}$
$n_i(t)$

Dynamika asynchronního pohonu



Náhrada impedance motoru provedena jako:

$$Z_{am} = R_1 + j\,X_{\sigma 1} + \frac{1}{\frac{1}{R_{Fe}} + \frac{1}{j\,X_h} + \frac{1}{\frac{R_2^{/}}{S} + j\,X_{\sigma 2}^{/}}}$$

Což odpovídá velikosti reálné části impedance:

$$R_1 + R_{Fe}\,X_h^2 \cdot \frac{R_2^{/2} + R_2^{/}\,R_{Fe}\,S + S^2\,X_{\sigma 2}^{/2}}{R_2^{/2}\left(R_{Fe}^2 + X_h^2\right) + 2\,R_2^{/}\,R_{Fe}\,S\,X_h^2 + S^2\left(R_{Fe}^2\left(X_h^2 + 2\,X_h\,X_{\sigma 2}^{/} + X_{\sigma 2}^{/2}\right) + X_h^2\,X_{\sigma 2}^{/2}\right)}$$

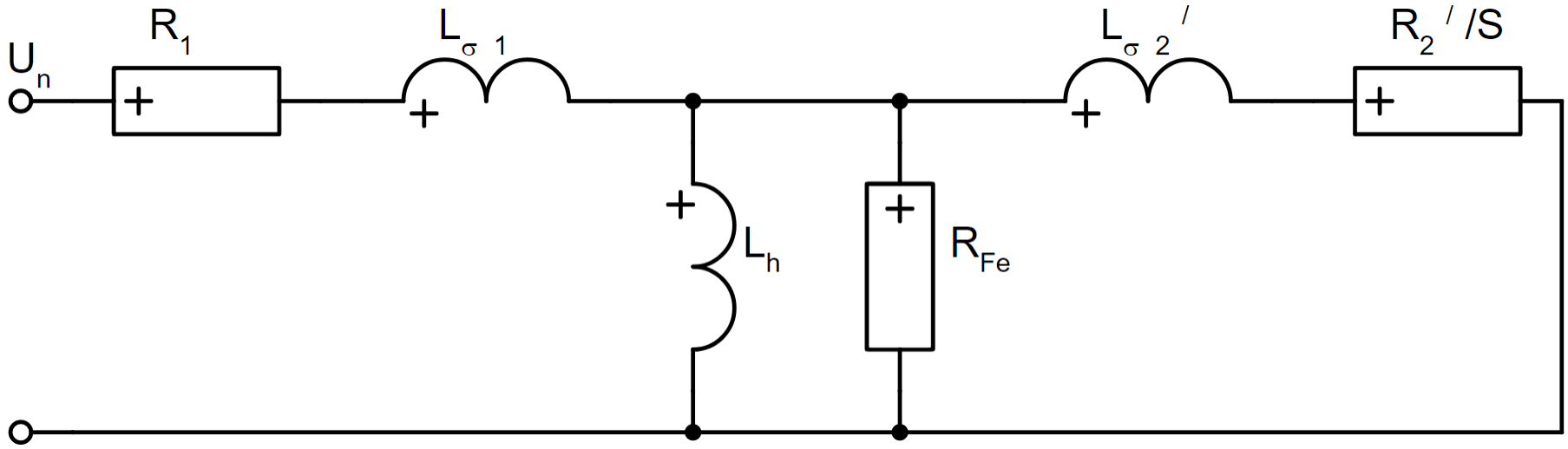
a záporně vzaté velikosti imaginární části impedance:

$$R_{Fe}^2\,S\,X_h^2 \cdot \frac{2\,R_2^{/}\,R_{Fe}\,X_h + S\left(R_{Fe}^2\left(X_h + X_{\sigma 2}^{/}\right) - X_h^2\,X_{\sigma 2}^{/}\right)}{\left(R_2^{/2}\left(R_{Fe}^2 + X_h^2\right) + 2\,R_2^{/}\,R_{Fe}\,S\,X_h^2 + S^2\left(R_{Fe}^2\left(X_h^2 + 2\,X_h\,X_{\sigma 2}^{/} + X_{\sigma 2}^{/2}\right) + X_h^2\,X_{\sigma 2}^{/2}\right)\right)\left(R_{Fe}^2 + X_h^2\right)} + \frac{X_h^3}{R_{Fe}^2 + X_h^2} - X_h - X_{\sigma 1}$$

Parametry identifikované z chodu naprázdno:

$$R_{Fe} = U_n^2\,[kV]\;\frac{10^6}{dP0\,[W]} \qquad Y_0 = \frac{I_0}{U_n\,[kV]\;\frac{10^3}{\sqrt{3}}} \qquad X_h = \frac{1}{\sqrt{Y_0^2 - \frac{1}{R_{Fe}^2}}}$$

Dynamika asynchronního pohonu



Obdobně z chodu nakrátko:

$$Rk = \frac{\Delta P_K}{3 \cdot I_K^2} \qquad Z_K = \frac{U_K}{\sqrt{3} \cdot I_K} \qquad X_\sigma = \sqrt{Z_K^2 - R_K^2} \cdot \frac{f_N}{f_{MĚŘÍCÍ}} \qquad R_2^/ = R_K - R_1$$

R_1 měřeno ohmickou metodou.