1 První příklad zadání C

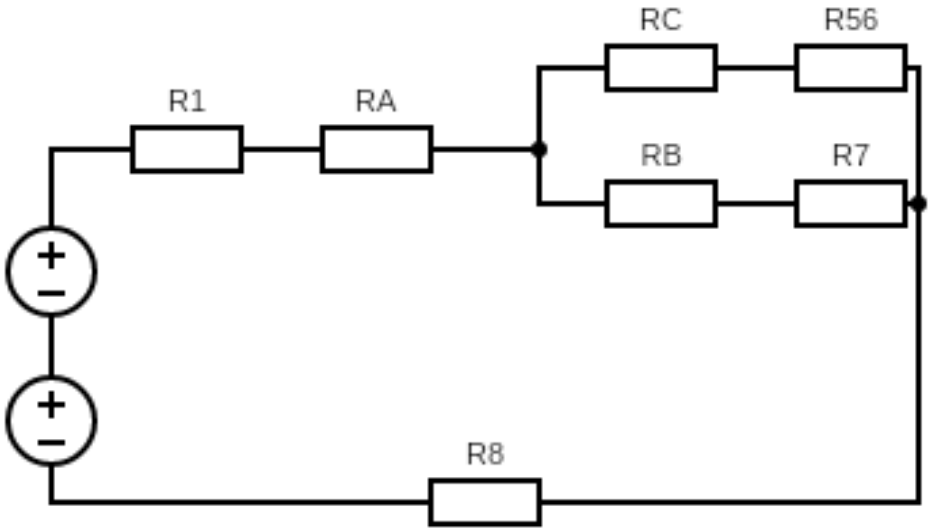

Figure 1: Úprava pomocí hvězdy

$$R_{56} = \frac{R_6 \times R_5}{R_6 + R_5}$$

$$R_{A1} = \frac{R_2 \cdot R_3}{R_2 + R_3 + R_4} + R_1$$

$$R_{B56} = \frac{R_2 \cdot R_4}{R_2 + R_3 + R_4} + \frac{R_6 \cdot R_5}{R_6 + R_5}$$

$$R_{C7} = \frac{R_3 \cdot R_4}{R_2 + R_3 + R_4} + R_7$$

$$R = \left(\frac{R_{B56} \cdot R_{C7}}{R_{B56} + R_{C7}}\right) + R_{A1} + R_8$$

$$I = \frac{U}{R}$$

$$U_{R3} = U - U_{R7} - U_{R1} - U_{R8}$$

$$U_{R7} = R_7 \cdot I$$

$$U_{R1} = R_1 \cdot I$$

$$U_{R3} = 3.6048$$

$$I_{R3} = \frac{U_{R3}}{R_3}$$

$$I_{R3} = 0.0190$$

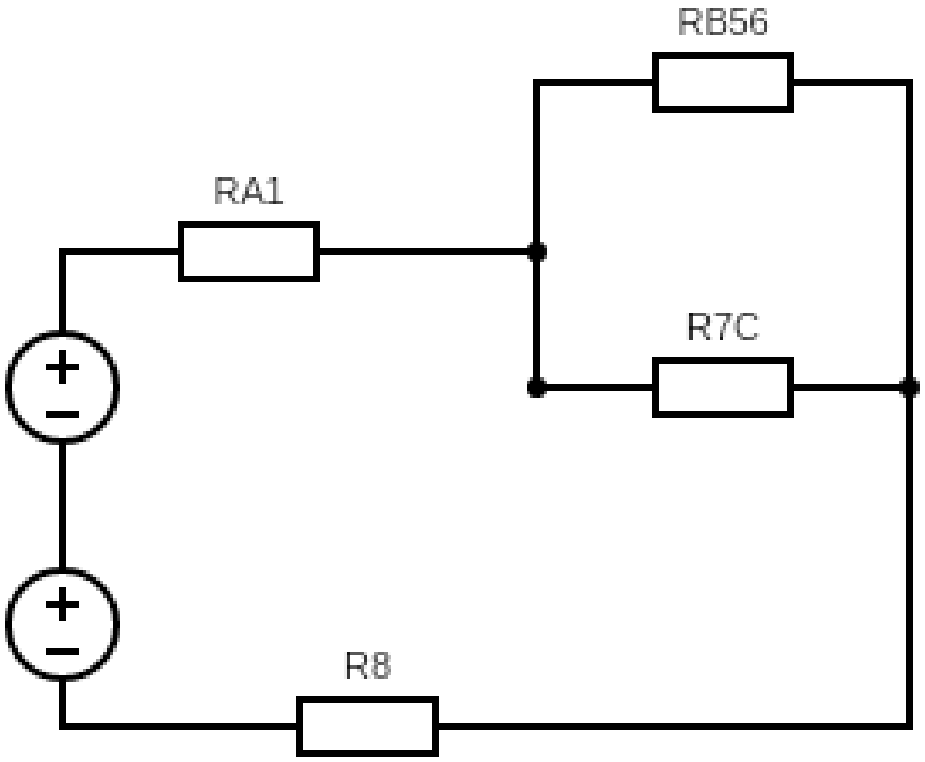

Figure 2: Další úprava

2 Řešení druheho příkladu

Úprava:

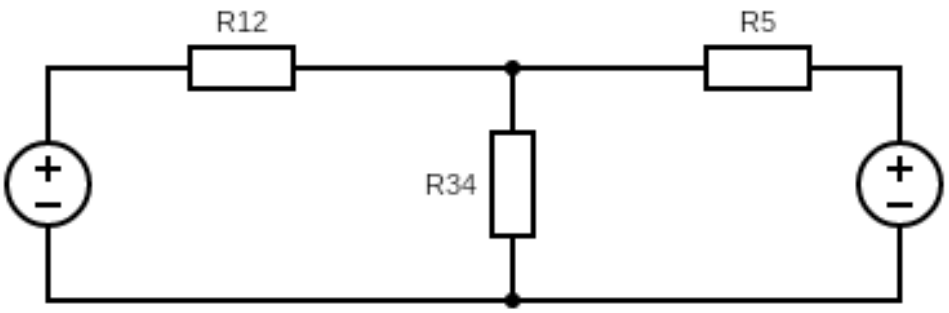

Figure 3: Další úprava

$$R_i = \frac{R_{12} \times R_5}{R_{12} + R_5}$$

$$R_i = \frac{950 \times 80}{950 + 80} \quad \Rightarrow \quad R_i = 73.786$$

$$I_x = \frac{U_2 - U_1}{R_{12} + R_5}$$

$$I_x = \frac{180 - 130}{950 + 80} \quad \Rightarrow \quad I_x = 0.049$$

$$U_i = U_1 + R_i \times I_x$$

$$U_i = 130 + 950 \times 0.049$$

$$I_{R34} = \frac{U_i}{R_i + R_{34}}$$

$$\frac{176.55}{73.786 + 150} \quad \Rightarrow \quad I_{R34} = 0.789$$

$$U_{R34} = 0.789 \times 150 \quad \Rightarrow \quad U_{R34} = 118.35\,\text{V}$$

$$U_{R4} = 118.35\,\text{V}$$

$$I_{R4} = \frac{118.35}{650} \quad \Rightarrow \quad I_{R3} = 0.1821\,\text{A}$$

3 Reseni tretiho prikladu

$$\text{Uzel A:} \quad \frac{130 - U_A}{47} + \frac{U_B - U_A}{28} - \frac{90 - (U_B - U_A)}{58} - \frac{U_A}{39} = 0$$

$$\text{Uzel B:} \quad \frac{5}{10} + \frac{90 - (U_B - U_A)}{58} - \frac{U_B - U_A}{28} - \frac{U_B - U_C}{35} = 0$$

$$\text{Uzel C:} \quad \frac{U_B - U_C}{35} - \frac{5}{10} - \frac{U_C}{25} = 0$$

$$U_A = 43.9024\,\text{V}$$

$$U_{R2} = U_A \quad \Rightarrow \quad U_{R2} = 43.9024\,\text{V}$$

$$I_{R2} = \frac{U_{R2}}{39} \quad \Rightarrow \quad I_{R2} = 1.1257\,\text{A}$$

4 Reseni Ctvrteho prikladu

5 Reseni Pateho prikladu

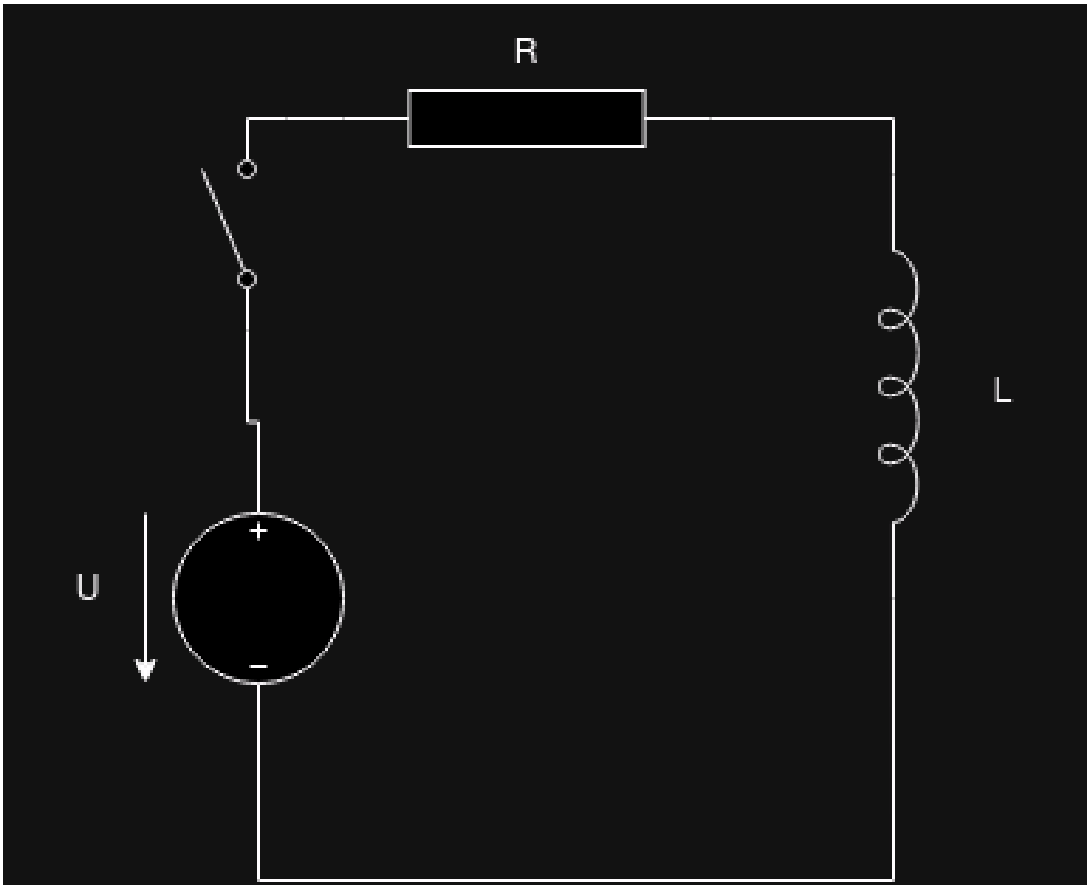

Figure 4: Paty priklad

Z ceho budeme vychaze

$$i = \frac{U_r}{R} \quad \Rightarrow \quad \text{Ohmův zákon}$$

$$U_r + U_r = U \quad \Rightarrow \quad \text{Kirchhoffův druhý zákon}$$

$$i' = \frac{U_c}{L}, \quad i(0) = i_{L_0}$$

Samotny vypocet

Kroky: 1. Nejprve vyjádříme U_r z první rovnice. 2. Dosadíme U_r do druhé rovnice. 3. Poté dosadíme výsledek do třetí rovnice.

$$i' = \frac{U}{L} - \frac{R}{L} \times i$$

Úprava:

$$L \times i' + R \times i = U$$

Charakteristická rovnice:

$$L\lambda + R = 0 \quad \Rightarrow \quad \lambda = \frac{-R}{L}$$

Očekávané řešení:

$$i(t) = I_L e^{\lambda t} \quad \Rightarrow \quad I_L(t) = I_L e^{\frac{-R}{L}t}$$

Dosadíme do upravené rovnice:

$$I'_L(t) = \frac{U}{L} e^{\frac{R}{L}t}$$

Jelikož se jedná o derivaci, musíme integrovat:

$$\frac{U}{L} \int e^{\frac{R}{L}t}\, dt$$

Substituce: $u = \frac{R}{L}t \quad \Rightarrow \quad du = \frac{R}{L}\, dt$

$$\frac{du}{dt} = \frac{R}{L}, \quad \text{takže} \quad dt = \frac{L}{R} du$$

$$\frac{U}{L} \int e^u \times \frac{L}{R}\, du$$

Zjednodušení:

$$\frac{U}{L} \times \frac{L}{R} \int e^u\, du$$

$$\frac{U}{R} e^u + C$$

Dosadíme zpět:

$$I_l = \frac{U}{R} + i(0) e^{\frac{R}{L} \times t}$$

$$i(0) =_{LP} \rightarrow 8 - \frac{U}{R} = i(0)$$

$$I_L = \frac{U}{R} + (8 - \frac{U}{R}) \times e^{\frac{R}{L}t}$$

$$I_L = \frac{1}{2} + \frac{15}{2} \times e^{-5 \times t}$$

graf prubehu:

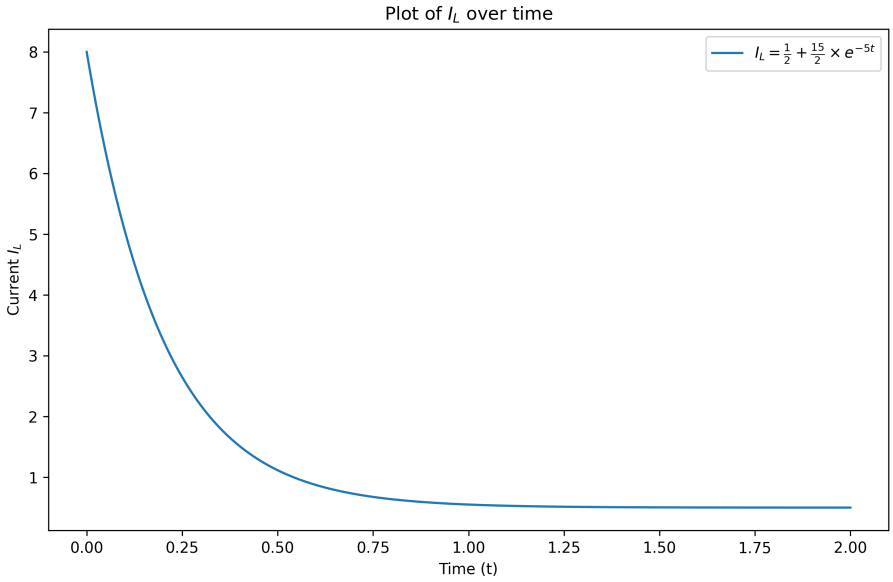

Figure 5: graf rovnice