Exercise 1

For the circuit shown below find the currents $i_{L1}(t)$, $i_{L2}(t)$ and the voltages $u_{C1}(t)$, $u_{C2}(t)$. Use a numerical solution to the differential equations, when $R_0 = 100 \text{ k}\Omega$, $R_1 = 300 \Omega$, $R_2 = 10 \text{ k}\Omega$, $L_1 = 0.01 \text{ mH}$, $L_2 = 10 \text{ mH}$, $C_1 = 10 \mu\text{F}$, $C_2 = 10 \text{ nF}$, and $U_0 = 10 \text{ kV}$. The switch has been opened for a long time. Use the function ode23t for faster calculation.



Exercise 2

For the circuits shown below find the current $i_L(t)$ and the voltage $u_C(t)$. Use a numerical solution to the differential equations, when $R_1 = 10 \Omega$, $R_2 = 10 \Omega$, L = 10 mH, $C = 100 \mu\text{F}$ and $U_S = 10 \text{ V}$. The switch has been opened for a long time. Use time interval $0 \le t \le 10 \text{ ms}$.



Circuits for Exercise 2

c)

Modify the script to solve the problem a) when DC source is replaced by harmonic source: $u_s(t) = 10 \sin(\omega t) \text{ V}$, f = 600 Hz.

d)

Modify the script to solve the problem a) when DC source is replaced by pulse source: $u_s(t) = 10$ V at $0 \le t \le 5$ ms, $u_s(t) = 0$ V at t > 5 ms and t < 0 ms.

e)

Calculate eigen-values of matrix A.