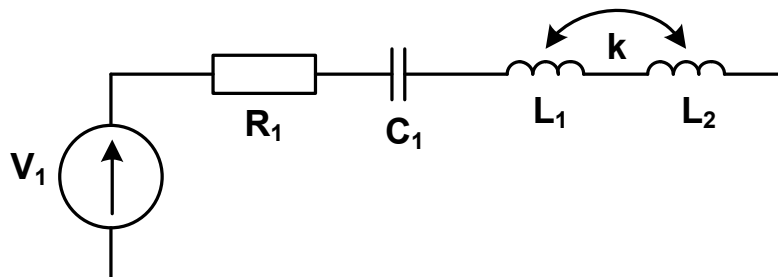


Module name: **Electrical Circuits 2**  
Module ID: **IS-FEE-10085S**  
Module type: **Workshop**  
Semester: **summer 2023/2024**  
Instructor: **Jarosław Forenc, [j.forenc@pb.edu.pl](mailto:j.forenc@pb.edu.pl)**

**Workshop 2 (19.03.2024) / Workshop 3 (16.04.2024)**

1. The figure shows an electric circuit with magnetic coupling. Use the PSpice program to simulate the operation of the circuit with both positive and negative coupling. Set the coupling coefficient  $k = 0.5$ . Choose values for the other elements so that differences in current waveform can be observed under positive and negative coupling conditions.



The report should include:

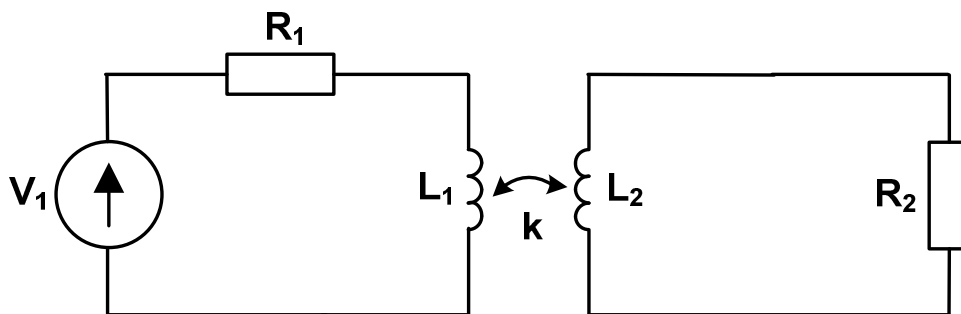
- values of the element used
- for a system with positive coupling:
  - o electrical circuit diagram (from PSpice)
  - o calculations of current in the circuit
  - o plot of the current in the electrical circuit (from the PSpice program)
  - o effective value of the current in the electrical circuit (determined in the PSpice program)
- for a system with negative coupling:
  - o electrical circuit diagram (from PSpice)
  - o calculations of current in the circuit
  - o plot of the current in the electrical circuit (from the PSpice program)
  - o effective value of the current in the electrical circuit (determined in the PSpice program)
- conclusions

2. Perform a parametric analysis on the electric circuit from problem no. 1 for systems with positive and negative coupling. In both cases, vary the values of the coupling coefficient  $k$ . Conduct simulations for  $k = 0.0, 0.3, 0.6, 1.0$ .

The report should include:

- values of the element used
- for a system with positive coupling:
  - o electrical circuit diagram (from PSpice)
  - o plot of the currents in the electrical circuit (from the PSpice program)
- for a system with negative coupling:
  - o electrical circuit diagram (from PSpice)
  - o plot of the currents in the electrical circuit (from the PSpice program)
- conclusions

3. The figure shows an electric circuit with magnetic coupling. Use the PSpice program to simulate the operation of the circuit with both positive and negative coupling. Given parameters:  $v_1(t) = 10\sin(314t)$  V,  $R_1 = 100 \Omega$ ,  $L_1 = 20$  mH,  $L_2 = 100$  mH,  $R_2 = 50 \Omega$ . Observe the plot of the current in the primary and secondary sides for  $k = 0, 0.5$ , and  $1.0$ .



The report should include (for a system with positive and negative coupling):

- electrical circuit diagram (from PSpice)
- plots of the currents in the the primary and secondary sides for  $k = 0, 0.5$  and  $1.0$
- conclusions

16.04.2024

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