Two-port Networks
Laboratory V

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1 Goal of the exercise

The aim of this exercise is to familiarize with experimental methods of determining two-port network parameters by measuring output and input voltages and currents, and then compare theoretical and experimental results

2 Two-port networks

Two-port network can be regarded as "black box" with its properties specified by a characteristic matrix. It allows us to simplify large circuit with those "black boxes" and move to higher level of abstraction, instead of using simple passive element now we can using complex circuits but seeing them as simple 2×2 matrix similar to one in eq. (1).

Figure 1: Two-port diagram

$$\mathbf{Z} \begin{bmatrix} i_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} z_{11} & z_{12} \\ z_{21} & z_{22} \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} v_1 \\ v_2 \end{bmatrix} \qquad (1)$$
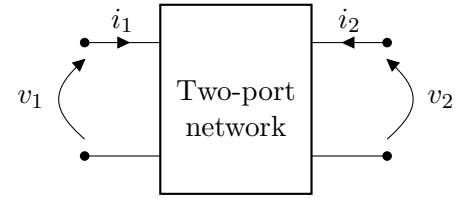
Characteristic matrix can have form of impedance $\mathbf{Z}$, admittance $\mathbf{Y}$ or chain(ABCD) matrix and many more forms which we are not going to use during this exercise.

3 Course of measurements

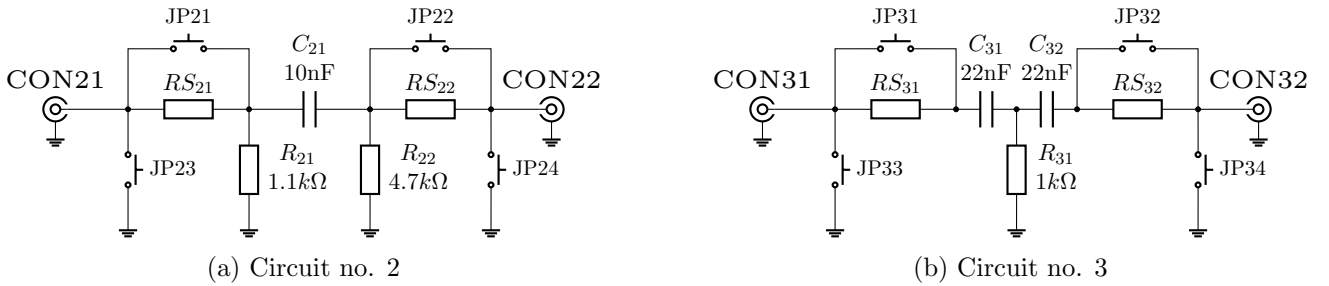(a) Circuit no. 2

(b) Circuit no. 3
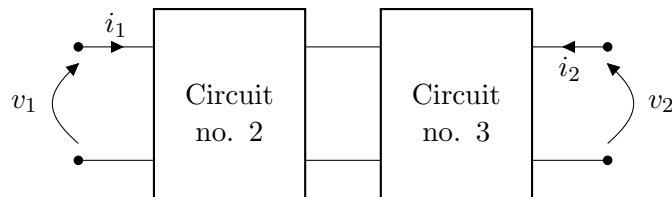
Figure 2: Measured circuits

Figure 3: Chain configuration
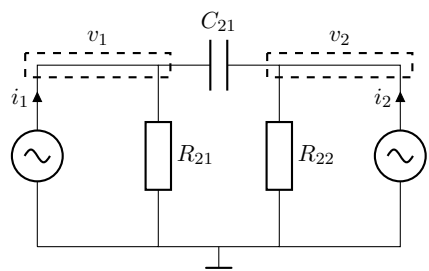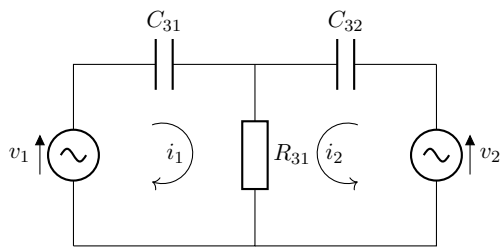
4 Theoretical calculations

Figure 4: Simplified circuit no. 2

Figure 5: Simplified circuit no. 3

5 Comparison

6 Conclusions