

Verification of KCL for AC Circuits

EXP 8 Report

Course No: EEE 164

Experiment No: 08
Department: CSE
Sec: B2

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Date of Performance: 12.07.2025
Date of Submission:

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1 Objectives

This experiment is designed to:

- Verify KCL for AC circuits.

Upon successful completion of this experiment, we should be able to:

- Construct RLC circuits.
- Understand the validity of analytical methods used in theory.

2 Apparatus

1. Function Generator
2. Oscilloscope
3. Multimeter
4. Two $100\ \Omega$ resistors
5. One $120\ \Omega$ resistor
6. One $1\ \mu\text{F}$ capacitor
7. Breadboard

The ratings of the equipment supplied were checked.

3 Experimental Setup

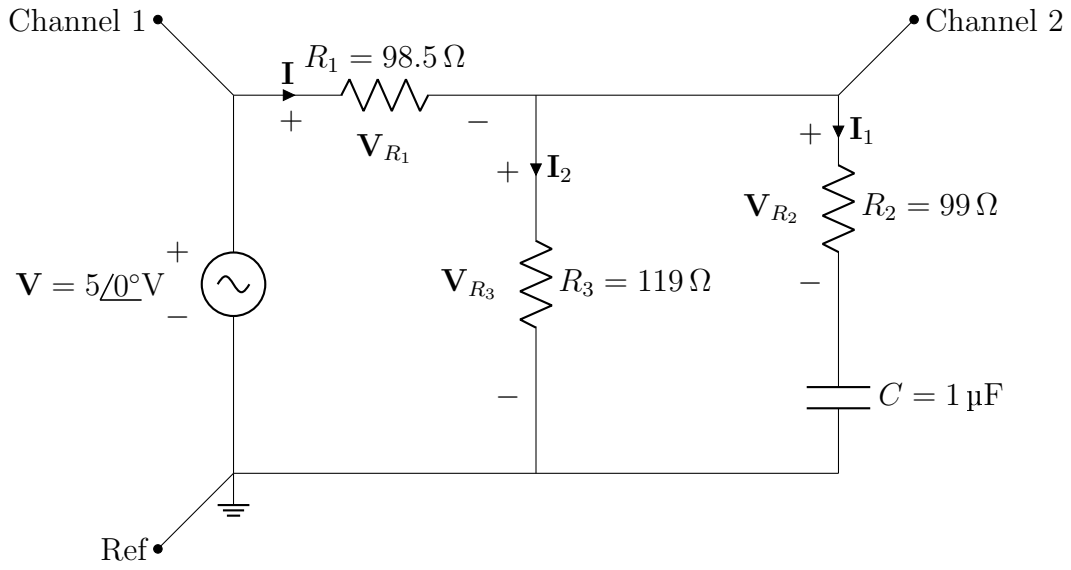


Fig 1: Circuit 1

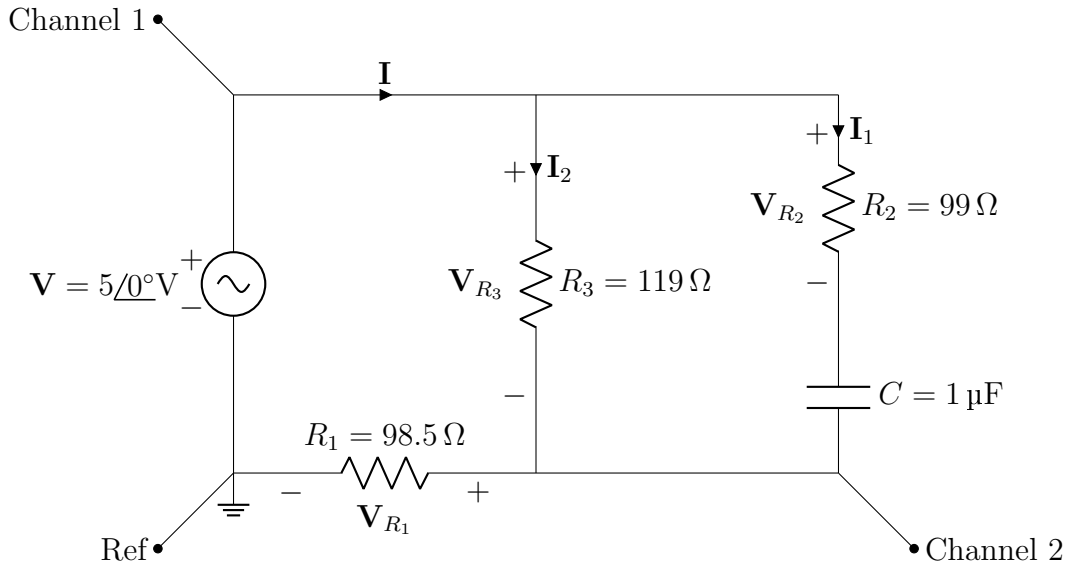


Fig 2: Circuit 2

4 Procedure

1. The resistance of the resistors was measured with the help of the multi-meter and the values were written down the table below.

2. The frequency, f of the function generator was set at 1 kHz. The power source was not turned on yet.
3. At first, circuit was setup as shown in Fig 1.
4. Then the magnitude and phase of the voltage \mathbf{V}_{R_3} were determined using the multimeter and the oscilloscope respectively.
5. Then the phasor currents $\mathbf{I}_1 = \mathbf{I}_{R_2} = \mathbf{I}_C = \frac{\mathbf{V}_{R_3}}{Z_{RC}}$ and $\mathbf{I}_2 = \frac{\mathbf{V}_{R_3}}{R_3}$ were determined mathematically, where Z_{RC} is the equivalent impedance of R_2 and C .
6. Then the circuit was setup as shown in Fig 2.
7. Then the magnitude and phase of the voltage \mathbf{V}_{R_1} were determined using the multimeter and the oscilloscope respectively.
8. Then the phasor current $\mathbf{I} = \mathbf{I}_{R_1} = \frac{\mathbf{V}_{R_1}}{R_1}$ was determined mathematically.
9. Then the phasor voltage \mathbf{V}_{R_2} was determined mathematically.
10. The steps 3-9 were repeated for 500 hertz and 2 kHz source frequency.
11. The phasor values of \mathbf{I} , \mathbf{I}_1 and \mathbf{I}_2 were determined theoretically for the three frequencies and compared to the experimentally found values.

5 Data Collection

Measurements:

$$R_1 = 98.5 \Omega$$

$$R_2 = 99 \Omega$$

$$R_3 = 119 \Omega$$

Table:

$f(\text{kHz})$	$\mathbf{V}_{R_2}(\text{V})$	$\mathbf{V}_{R_3}(\text{V})$	$\mathbf{I}_1(\text{mA})$	$\mathbf{I}_2(\text{mA})$	$\mathbf{V}_{R_1}(\text{V})$	$\mathbf{I}(\text{mA})$	$\mathbf{I}_1 + \mathbf{I}_2(\text{mA})$
0.5							
1							
2							

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