# Circuit Theory and Electronics Fundamentals

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Example Laboratory Report

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# 1 Introduction

The testeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee objective of this laboratory assignment is to study a circuit containing a sinusoidal voltage source $V_I$ connected to a resistor $R$ and a capacitor $C$

# 2 Theoretical Analysis

In this section, the circuit shown in Figure **??** is analysed theoretically, in terms of its time and frequency responses.

# 3 Valores octave

# 4 Simulation Analysis

## 4.1 Operating Point Analysis

Table 2 shows the simulated operating point results for the circuit under analysis. Compared to the theoretical analysis results, one notices the following differences: describe and explain the differences.

| Name | Value [A or V] |
|------|---------------:|
| V1 | -1.887311 |
| V2 | -5.704042 |
| V3 | 6.994799 |
| V4 | -1.878469 |
| V5 | -2.977654 |
| V6 | -5.113245 |
| V7 | -1.887056 |
| Ia | -0.001857 |
| Ib | -0.001857 |
| Ic | -0.001058 |
| Id | 0.001004 |

Table 1: Operating point. A variable preceded by @ is of type *current* and expressed in Ampere; other variables are of type *voltage* and expressed in Volt.

# 5 Conclusion

In this laboratory assignment the objective of analysing an RC circuit has been achieved. Static, time and frequency analyses have been performed both theoretically using the Octave maths tool and by circuit simulation using the Ngspice tool. The simulation results matched the theoretical results precisely. The reason for this perfect match is the fact that this is a straightforward circuit containing only linear components, so the theoretical and simulation models cannot differ. For more complex components, the theoretical and simulation models could differ but this is not the case in this work.

| Name | Value [A or V] |
|---|---|
| @gb[i] | -1.85722e-03 |
| @id[current] | 1.003968e-03 |
| @r1[i] | -1.85714e-03 |
| @r2[i] | 1.857222e-03 |
| @r3[i] | -8.11657e-08 |
| @r4[i] | 7.994898e-04 |
| @r5[i] | -2.86119e-03 |
| @r6[i] | -1.05765e-03 |
| @r7[i] | -1.05765e-03 |
| v(1) | -1.88731e+00 |
| v(2) | -5.70404e+00 |
| v(3) | 6.994799e+00 |
| v(4) | -1.87847e+00 |
| v(5) | -2.97765e+00 |
| v(6) | -5.11325e+00 |
| v(7) | -1.88706e+00 |
| v(8) | -5.11325e+00 |

Table 2: Operating point. A variable preceded by @ is of type *current* and expressed in Ampere; other variables are of type *voltage* and expressed in Volt.