

Circuit Theory and Electronics Fundamentals

Integrated Masters in Aerospace Engennering, Técnico, University of Lisbon

Laboratory Report 1- Group 28

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Contents

1	Introduction	3
2	Introduction	3
3	Conclusion	4

1 Introduction

2 Introduction

The aim of this laboratory assignment is to analyse a RC circuit, which contains a sinusoidal voltage source v_s and a capacitor C . The other components present in this four mesh circuit are 7 resistors (from R_1 to R_7) and a linearly dependent current I_b and voltage V_d sources.

The voltage controlled current source depends on the constant K_d and the current controlled voltage source has a linear dependence on the constant K_b .

The voltage source varies in time as it follows:

$$v_s(t) = V_s u(-t) + \sin(2\pi f t) u(t) \quad (1)$$

where

$$u(t) = e \begin{cases} 0 & t < 0 \\ 1 & t \geq 0 \end{cases} \quad (2)$$

The data generated automatically by the Python script is given in the table below.

Name	Value [A]
R1	1.041113e+03
R2	2.099452e+03
R3	3.131091e+03
R4	4.119470e+03
R5	3.115588e+03
R6	2.047994e+03
R7	1.027544e+03
Vs	5.068716e+00
C	1.041275e-06
Kb	7.287471e-03
Kd	8.115684e+03

Table 1: Octave Mesh Method Results. All variables are of type *current* and expressed in Ampere.

The nodes (from V_1 to V_8) are displayed as it shows in Figure

In Section 1, for $t < 0$, the voltage and the currents in all branches were determined with the node method. In Section 2, both the equivalent resistor R_{eq} , seen from the capacitor terminals, and the nodes voltage were computed. The natural solution is then escrever aqui o que é que se vai fazer em cada seccao porque isto ainda vai mudar, logo se ve

3 Conclusion

It was agreed by the members of the group that the main goal of the task proposed was achieved. As presented, both theoretical and simulation results (obtained using Octave tools and ngpsice simulator, respectively) matched, reaching total accuracy. Despite the initial belief that the considerable number of components of the circuit could cause some disparity in the results, such did not happen. This proves not only the efficiency of both mesh and node methods to analyse the circuit, as well as the simulator used.