Circuit Theory and Electronics Fundamentals

Masters of Aeroespace Engineer, Técnico, University of Lisbon

Laboratory Report

Group 37

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May 23, 2021

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1 Introduction

The objective of this laboratory assignment is to choose the best architecture of the Gain and Output amplifier stages in order to build an audio amplifier. We did this while paying attention to the merit of the project designed.
This merit is calculated exactly as the next equation:

$$M = \frac{voltageGain * bandwidth}{cost * lowerCutoffFreq} \tag{1}$$

Being the cost the following:

- cost = cost of resistors + cost of capacitors + cost of transistors

- cost of resistors = 1 monetary unit (MU) per kOhm

- cost of capacitors = 1 MU/μF

- cost of diodes = 0.1 MU per transistor

To obtain the best values for the circuit, we've used the matlab simulink to optimize them for the best merit.
In Section 2, a theoretical analysis of the circuit is presented. In Section 3, the circuit is analysed by simulation, and the results are compared to the theoretical results obtained in Section 2. The conclusions of this study are outlined in Section 4.

2 Theoretical Analysis

In this section we will analyse theoretical our audio amplifier circuit.
To do so, and because there were several things to be analysed, we divided the theoretical analysis in the following subsections that explain the different sectors that our circuit has and also each one will be detailed separately.

3 Simulation Analysis

In this section, Ngspice was used in order to simulate the audio converter.

4 Conclusion

In this laboratory assignment, the goal especified in the introduction has been achieved with a great merit.
All analyses have been performed both theoretically using the Octave maths tool and by circuit simulation using the Ngspice tool. When comparing these last two we conclude that there aren't any disparity between the results and therefore no errors associated. So, we conclude that the architeture that we used can be validated.