Chapter 3 Lab Writeup

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February 8, 2017

Overview

The purpose of this lab is to evaluate non-ideal components and to simulate them using LTSpice. This is necessary because components in real life do not have ideal properties and are not perfect. This impacts the circuit and is necessary to understand how to simulate. In this lab we evaluate how the given value of a resistor varies from it's measured value as well as how other components vary in measurement from their given values.

Process

In order to achieve the purpose of this lab several tools were used. The tools used include an oscilloscope, a function generator, a voltage source, a digital multi-meter, and LTSpice. LTSpice was used to simulate the circuits and the rest of the tools were used to measure a physical circuit.

Several circuits were analyzed. First a resistor network voltage divider with a DC source was analyzed, then again with an AC source. After that an LR circuit was analyzed.

Results

Here are the results for the various experiments that were conducted in this lab.

Non-Ideal Resistors

For the given circuit an output voltage was found for the voltage divider. The output voltage was found to be 2.5V. Then the given circuit was constructed with non-ideal components. For 100 ohm resistors the resistance tolerance was found to be within 5 ohm of the given resistance. With the circuit constructed from non-ideal components the output voltage was found to be 2.498V which was very close to the ideal voltage.

Non-Ideal Voltage Source

For this part of the lab an AC circuit with a resistive load was analyzed. The circuit was setup with two different loads and measured. For both circuits the amplitude of the voltage source was measured to be 9V. The voltage was then measured across a 1K ohm resistor and was found to be 8.4V. The resistor was then replaced with a 220 ohm resistor and the voltage was found to be 7.2V.

Using the recorded values and the given equations several properties of the voltage source could be found. R_out was found to be 77.39Ω.