

Lab 4: Resistivity of Nickel Chromium Wire and Use of the Wheatstone Bridge Circuit

Zachary Pouska
001103193

Natalie Tran
000698629

Joseph Pancho
002550975

PHYS 236 | Fall 2022
Date performed: 10/10/2022

1 Purpose

In this lab, we measured the resistance of a nickel chromium wire and calculated the resistivity ρ . We then built a Wheatstone bridge to find the resistances of individual capacitors.

2 Theory

Using nickel chromium wire (80% *Ni* – 20% *Cr*), we will apply the equations for calculating resistivity ρ .

For a given wire resistivity ρ , length L , and cross-sectional area A , the resistance R , is given by:

$$R = \frac{\rho l}{A}$$

Solving for ρ , the above equation is re-written as:

$$\rho = \frac{RA}{l}$$

Verifying the units for ρ :

$$\rho = \frac{\Omega m^2}{m} = \Omega m$$

3 Experiment Analysis

4 Procedure

For the first part of the lab, we first took six measurements of diameter of the nichrome wire (mounted on a bridge-board) using calipers, two measurements per group member. Using the data, we then calculated cross-sectional area of the wire (πr^2) and resistivity ($\rho = \frac{RA}{l}$), where R is the resistance (Ω) of the wire measured with a digital multimeter, A is the cross-sectional area, and l is the length of the wire. The resistivity we found was compared to the given range of resistivity of a nichrome wire: ($1.10 * 10^{-6} \Omega m$ to $1.50 * 10^{-6} \Omega m$).

For the second part of the lab,

5 Data and Graphs

5.1 Part 1

5.2 Part 2

5.3 Part 3

6 Results

7 Questions

7.1 Part 1

7.2 Part 2

7.3 Part 3

7.4 Part 4

8 Conclusion