Lab Report Electrostatics Resistive Paper Analog

Abstract

A description of the objective of this lab.

Introduction

Briefly introduce the physics behind. $\vec{J}=\sigma\vec{E}$ and $\nabla \cdot \vec{J} = -\frac{d\rho}{dt}$. What do these two equations mean? Why can we use this conductive paper as an analog to plot equipotential lines and electric field lines?

Experiment

Part I. Resistance measurement

Briefly describe the process of experiment.

What's your measurement result? Does the measured value depend on the size of the square? Explain why you get this conclusion.

Try to list the possible errors which may lead to the inconsistence between your measurement and conclusion.

Part II. Coaxial line

Briefly describe the purpose and the process of this part.

Present the equipotential line you obtained (the photo of your conductive paper) and label the voltage for each line. Can you sketch the equipotential line of 2V, 5V, and 8V? Is 5V midway between the inner conductor and outer conductor?

Try to analyze the possible reasons which lead to the discrepancy between the theoretical result and your measurement.

Measure the resistance between the inner and outer electrodes and calculate the capacitance per unit length of a coaxial in this experimental measurement. Calculate its corresponding theoretical capacitance and compare is with the value you experimentally obtained.

Part III. Transmission line

Briefly describe the purpose and the process of this part. Plot equipotential lines at 2V, 5V and 8V and label the voltage for each line (the photo of your conductive paper).

Measure the resistance between the two wires and calculate the capacitance per unit length of transmission line in this experimental measurement. Calculate its corresponding theoretical capacitance and compare is with the value you experimentally obtained.

Part IV Image method

Briefly describe the purpose and the process of this part. Replot the 2V equipotential line. Does method of images yield the same equipotential as found in the two-wire line? Try to explain your result.

Conclusion