Lab 2: Electric Field and Potential

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1 Purpose

To study the relationship between electric field and the electric potential difference associated with it.

2 Theory

The relationship between the electric field and electric potential difference will follow the equation $\Delta V = -\int_a^b \vec{E} \cdot ds$, which simplified is $\Delta V = \frac{k_e q}{r}$. This means electric potential will have a opposite yet linear relationship with the electric field, while having an inverse relationship with distance.

3 Experiment Analysis

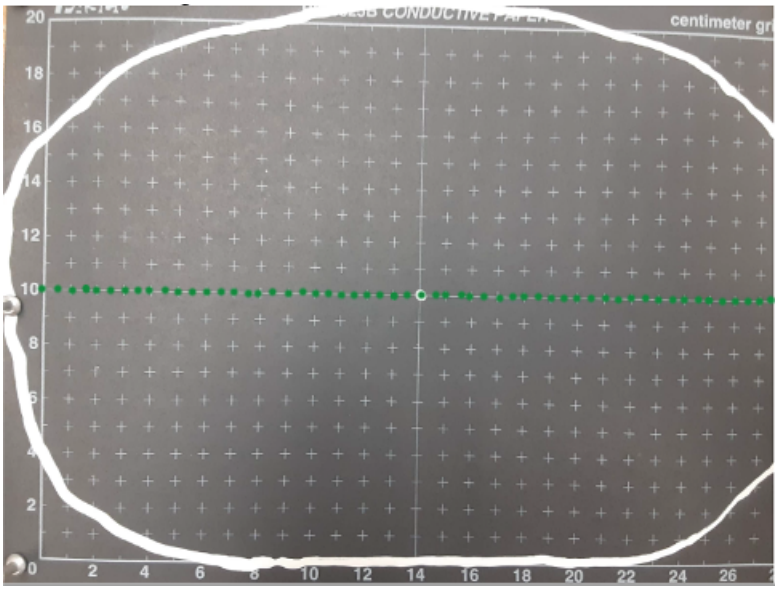
4 Procedure

The experiment is begun by "drawing" the patterns used for the experiments on the conductive surface using conductive ink. This step was performed by our instructor beforehand.

4.1 Perimeter of Conductive Ink and Point Charge

The configuration of electrodes below was used for this first part of the experiment. The small circular electrode (white dot) at the center was held at 10 Volts. The green dots indicate where the voltages were measured. 7 points were taking from each side of the positive electrode.

Figure 1: Perimeter of conductive ink and point charge setup



4.2 Two Point Charges

The goal of this experiment was to determine the shape of the equipotential lines resulting from two point charges on a conductive surface. In order to find these equipotential lines, we probed the conductive plate with a digital multimeter, and recorded the results on a piece of graph paper. We measured only four equipotential lines between the two point charges, ranging between 6V and 1.5V. In order to determine

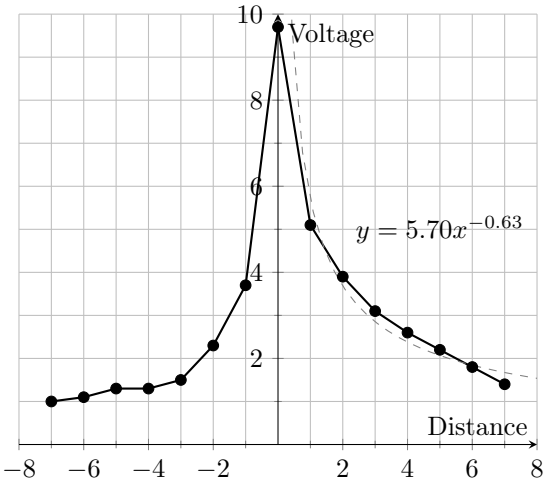
the electric field, we use an equation to estimate the magnitude from a potential difference between two points a and b.

$$E = \frac{-V_b - V_a}{\Delta x}$$

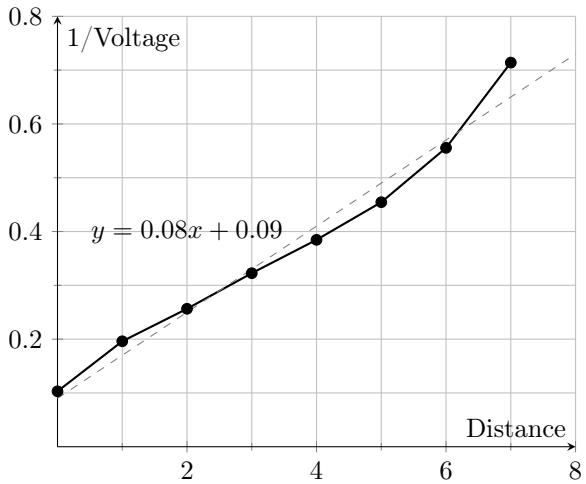
4.3 Two Plate Capacitor

This experiment was similar in nature to the previous one, but just with a different setup

5 Data and Graphs



[Fig 1.1] Table 1.1 visualized in a graph.



[Fig 1.2] The linearization of Fig 1.1.

6 Results

7 Questions

8 Conclusion