LAB 3 Report (Electric Fields)

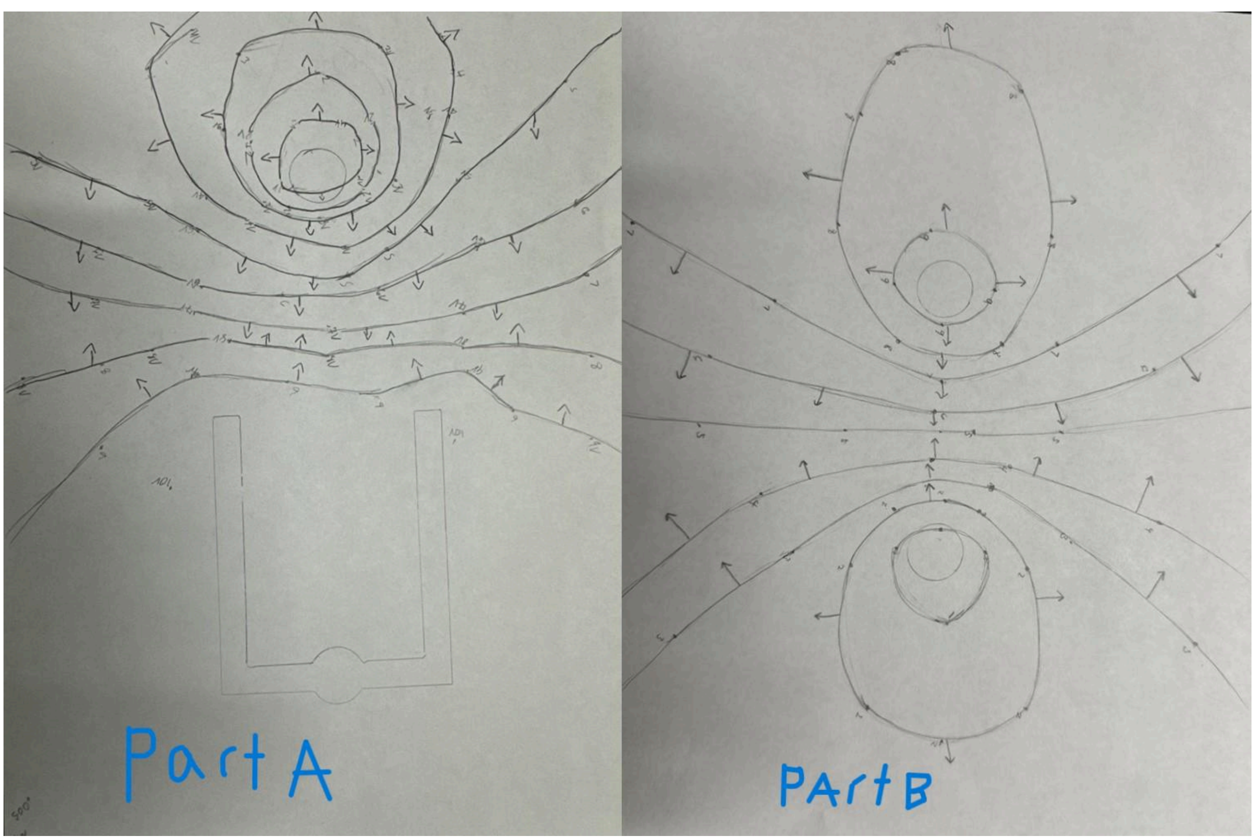
Abstract

This experiment aimed to map out constant-voltage curves around a pair of metal electrodes in order to visualize what is the electric field distribution in the circuit. The lab is made to demonstrate the relationship of the voltage and the equipotential lines. An examination of voltage differences and the curvature of constant-voltage curves revealed a direct correlation, which led to a greater understanding of the behavior of electric fields. Some of the characteristics of equipotential lines is that it represents electric potential around electric fields, in addition every point on the line is perpendicular to the electric field and that the closer the lines are between the equipotential lines the stronger the electric field is. The electric field maximum and minimum, is found through the rate of voltage over the rate of distance such as $E = \frac{\Delta\Phi}{\Delta x}$. So if the higher the voltage and more closeness between the line the bigger the electric field is.

Procedure

This lab involved mapping out constant-voltage curves around two patterns of paper using a voltmeter. By putting a curve/line of 20 different equal voltages -10 through 10 on the paper, the equipotential lines can visualize the electric field distribution. This setup involves having a power supply, voltmeter, U-Probe, pattern board with the 2 plate capacitor patterns and 2 pieces of paper. To set it up first attach the pattern board to the plate patterns from the bottom and connect it to the power supply and use 10 volts. Next prepare the paper and attach it to the board with tape and use the U-Probe and the voltmeter to measure the lines.

Raw Data



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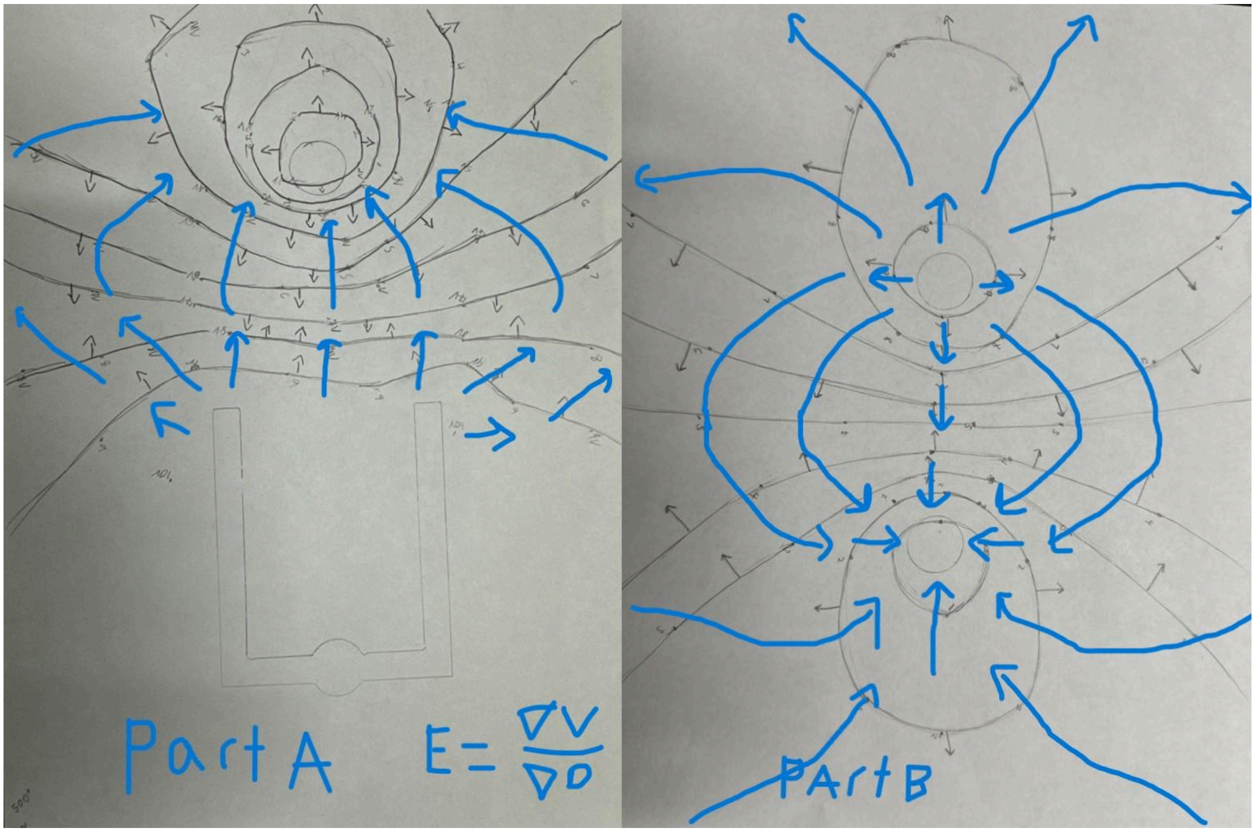
Calculation and Reasoning



The max value for the electric field would be when the equipotential lines are closest together while the minimum value would be when the equipotential lines are the farthest together as the equation of the electric field is the rate of voltage over the rate of distance. In order to find the electric field I would have to find the change of flux or volts over the rate of distance. E = $\frac{\Delta \Phi}{\Delta x}$.
For part A the max 1/.005m which is equal to 200 volts over meters for the minimum it is 1/.05m = 20 v/m For part B the max is 1/.007m which is 142.85 v/m. For the min it is 1/0.009m which is 11.11 v/m.