

ECE329 Project #1 Report

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1 Problem 1

1.1

The plot is shown as [Figure 1](#).

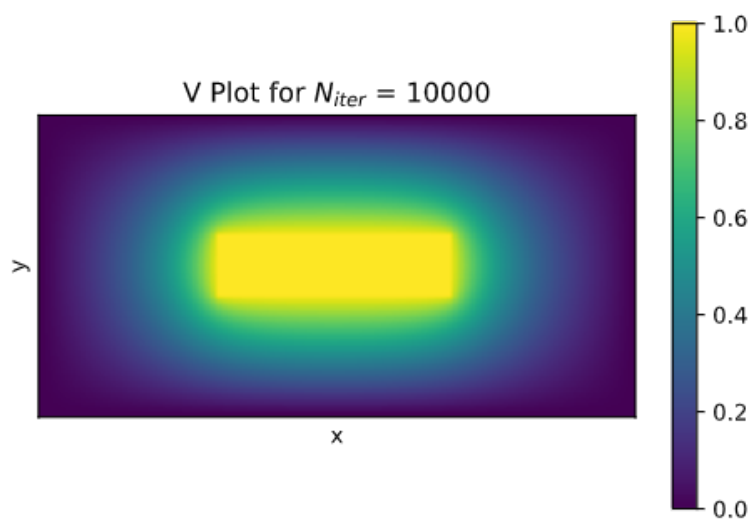


Figure 1: V over xy plane

1.2

The plot is shown as [Figure 2](#).

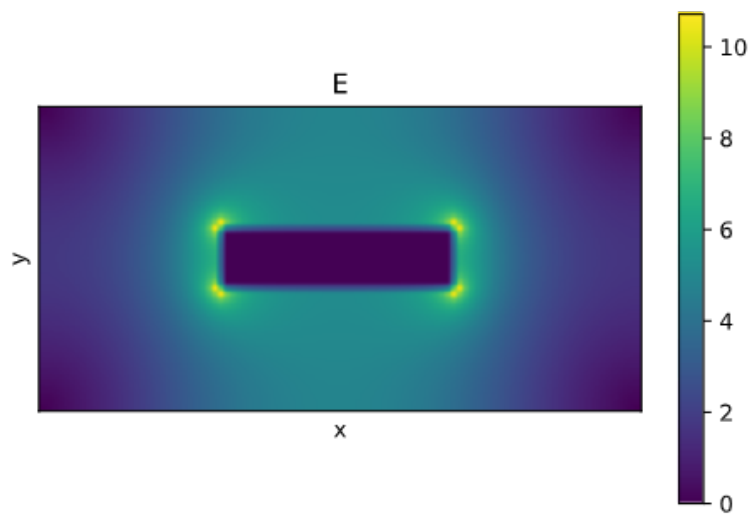


Figure 2: E over xy plane

According to the code:

```

1 maxE = np.max(E)
2 maxi, maxj = np.where(abs(E - maxE) <= 0.1)
3 maxx = maxj * delta_x
4 maxy = Y_max - maxi * delta_y
5 max_xy = np.append(maxx, maxy).reshape(2, -1).T
6 print("Points where E is at its maxima:")
7 print(max_xy)

```

and its output:

```

1 maxE = np.max(E)...
2 Points where E is at its maxima:
3 [[0.3 0.31]
4  [0.69 0.31]
5  [0.29 0.3 ]
6  [0.7 0.3 ]
7  [0.29 0.2 ]
8  [0.7 0.2 ]
9  [0.3 0.19]
10 [0.69 0.19]]

```

We can find that the maxima of E field are focused on four corners of the rectangle.

1.3

The plot is shown as [Figure 3](#).

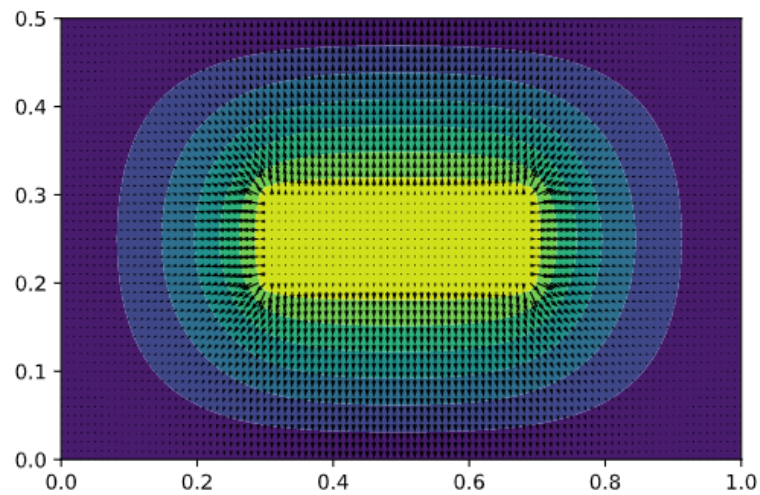


Figure 3: Contour of V and Vector Field of E

The contour lines and the vectors in the vector field are perpendicular with each other.

1.4

The plot of relative error of V is shown as [Figure 4](#). The error is in log-scale.

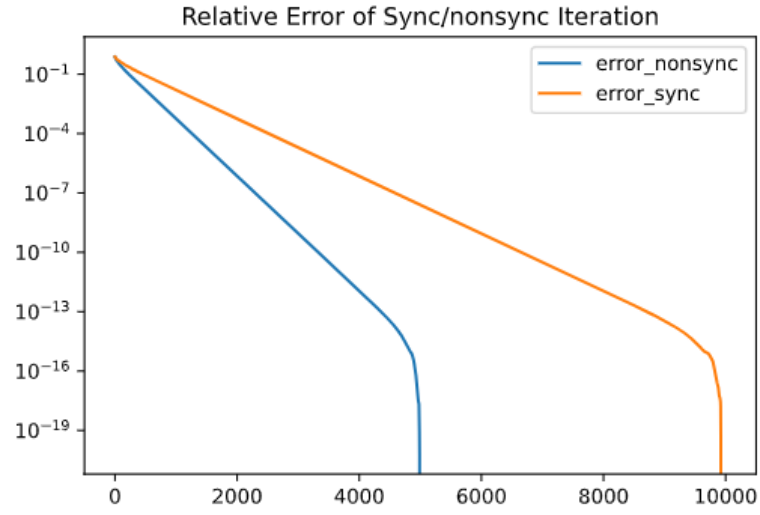


Figure 4: Relative Error of V of Sync/nonsync Iterations

2 Problem 2

The plot is shown as [Figure 5](#).

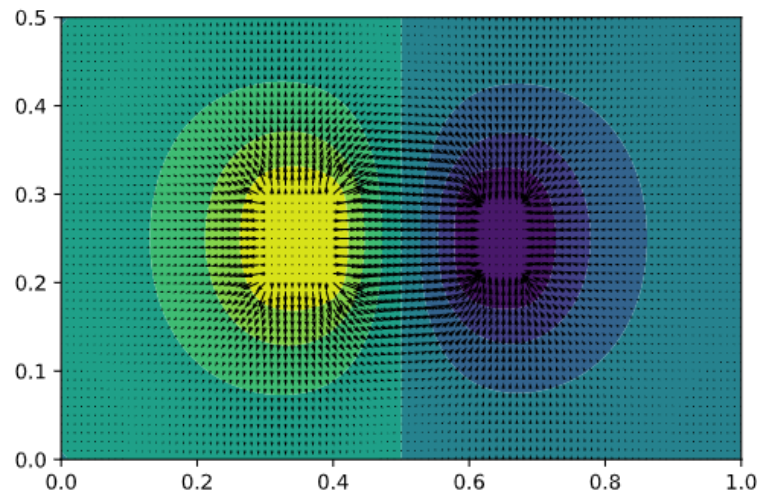


Figure 5: Contour of V and Vector Field of E for Problem 2