Indian Institute of Technology Guwahati

CFD ASSIGNMENT – 01

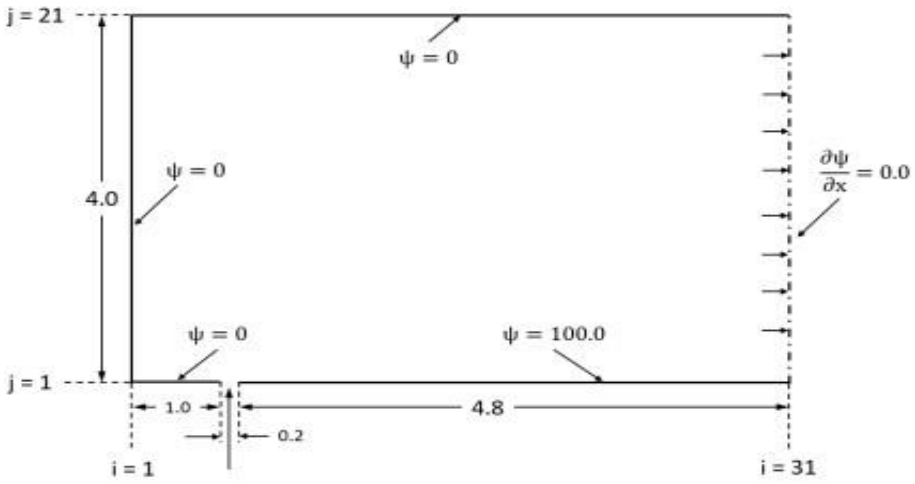
Submitted by :-

LOKESH KUMAR VERMA

ROLL NO. 224103314

Sp.-FLUID AND THERMAL

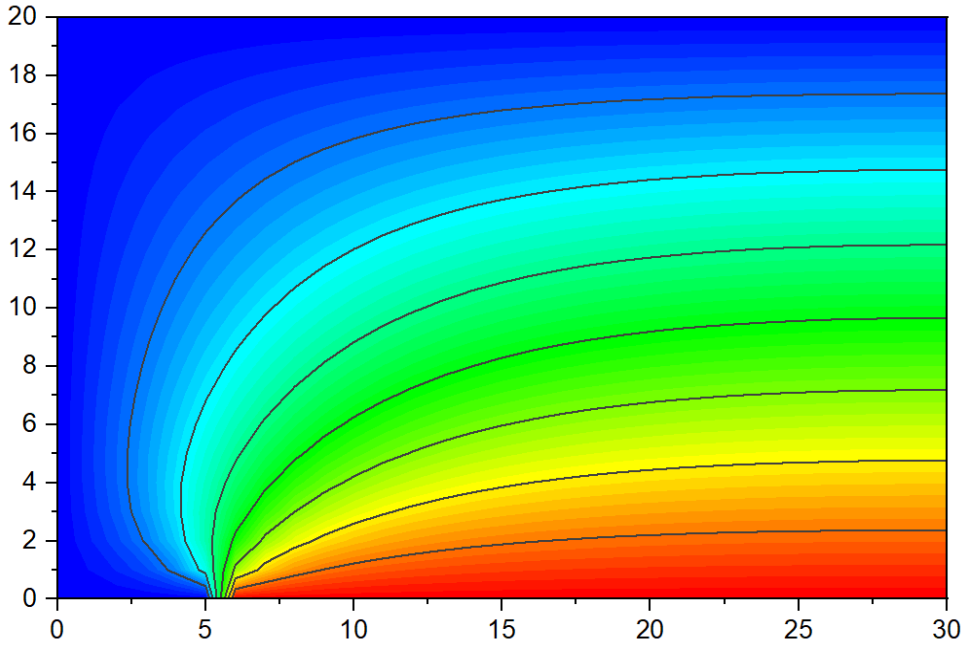
PROBLEM 1 //



The given partial differential equation is

$$\frac{\partial^2 \Phi}{\partial x^2} + \frac{\partial^2 \Phi}{\partial y^2} = 0$$

Considering grid size m*n as input the program gives us the values at specific grid points which is plotted using tecplot software. The obtained contour is shown below
(the results shown are obtained considering m=31 and n=21)

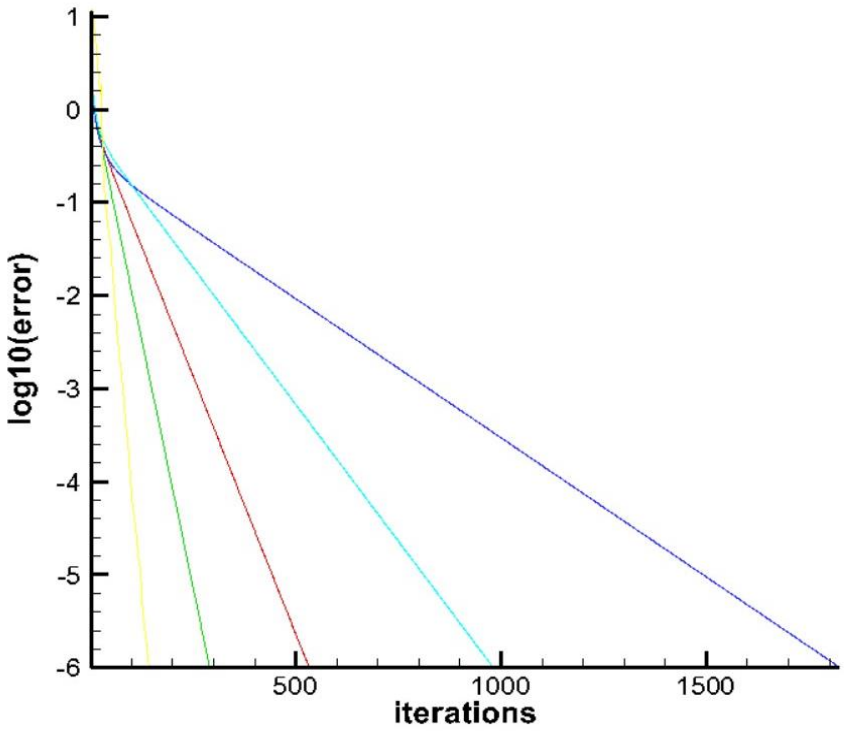


number of iterations for various process:

- Jacobi - 1827
- Point gauss siedel - 982
- Point successive over relaxation - 144
- TDMA - 533
- ADI - 291

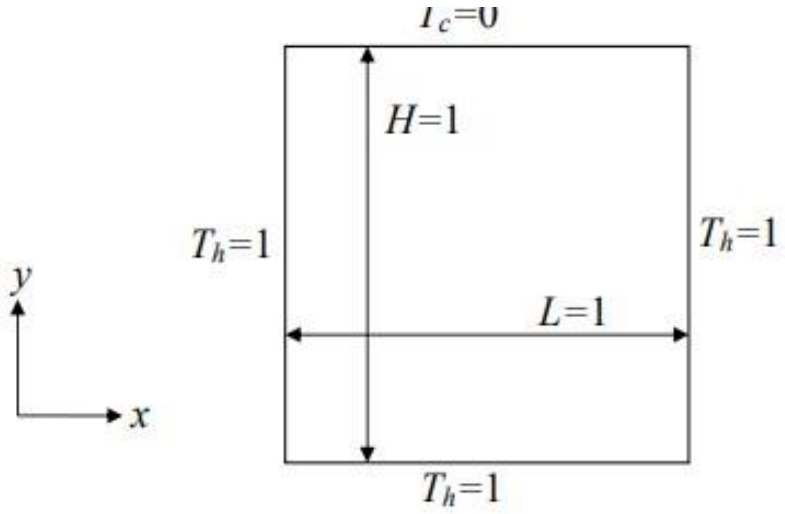
Comparision graph:

The graph between number of iterations and error is shown below. Number of iterations is shown along x axis and log of error is shown along y axis.



i. Red = TDMA
ii. Green = ADI
iii. Purple = jacobi
iv. Blue = point gauss siedel
v. Yellow = PSOR

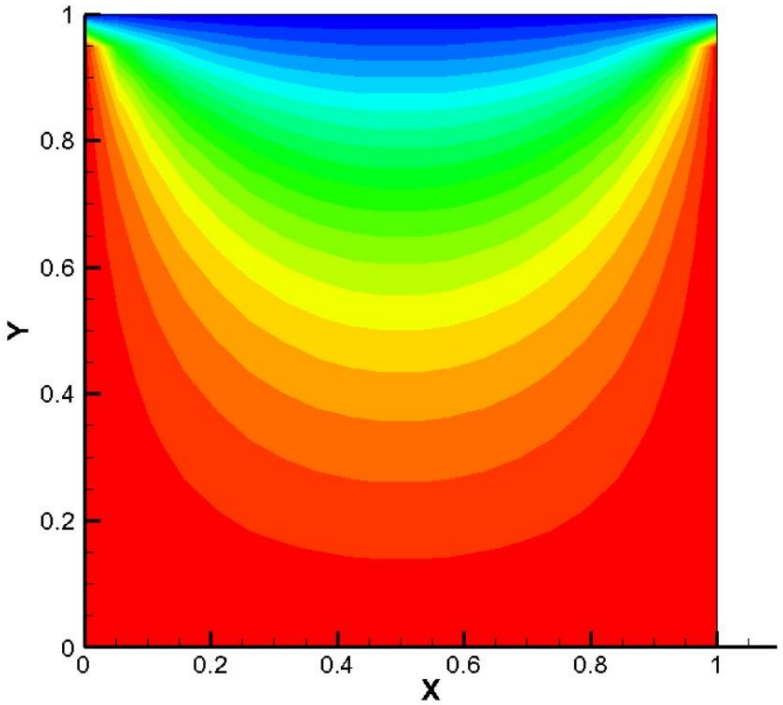
PROBLEM 2 //



The given partial differential equation is

$$\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} = 0$$

Considering grid size m*n as input the program gives us the values at specific grid points which is plotted using tecplot software. The obtained contour is shown below
(the results shown are obtained considering m=20 and n=20)

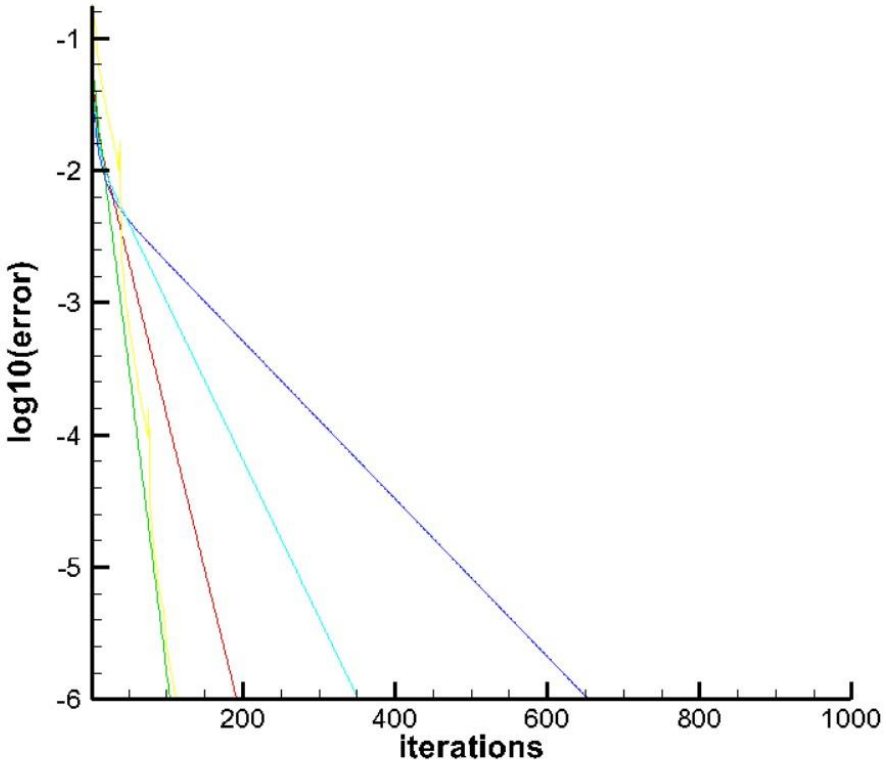


number of iterations for various process:

- Jacobi - 654
- Point gauss siedel - 352
- Point successive over relaxation - 113
- TDMA - 192
- ADI - 105

Comparision graph:

The graph between number of iterations and error is shown below. Number of iterations is shown along x axis and log of error is shown along y axis.



i. Red = TDMA
ii. Green = ADI
iii. Purple = jacobi
iv. Blue = point gauss siedel
v. Yellow = PSOR