

Computational Physics : Phy 453: Semester Jan-Apr 2023
to be completed by 16th Feb, 2023: Module : Diff eqns + PDE

Solving PDE by boundary conditions (10 marks): plot Temperature profiles.

Q3. Consider a 2-d plate of size 34x34. Solve the Laplaces equation on the lattice (assuming no time dependence of temperature T) to find out the temperature profile at different points on the lattice as discussed in the lectures. The boundary conditions at the edges of the plate are as follows:

At $x=1$, $T = 3.7$ for all y . At $x=34$, $T = 0.4$ for all y

At $y=1$, T decreases linearly from 3.7 to 0.4 as x changes from 1 to 34.

At $y=34$, T decreases linearly from 3.7 to 0.4 as x changes from 1 to 34.

The limit of convergence is 0.0001. Plot the temperature profile, labelling axes properly.

The tempertaure at point (20,20) is :

Q4. Consider a 2-d plate of size 34x34. Solve the Laplaces equation on the lattice (assuming no time dependence of temperature T) to find out the temperature profile at different points on the lattice as discussed in the lectures. The Neumann boundary conditions at the edges of the plate are as follows: Limit of convergence= 0.00001d0

The temperature at (1,1) =2000.

$A = dT/dx = -70$; $B = dT/dx = -40$;

$C = dT/dy = 20$; $D = dT/dy = -10$

What is the temperature at (10,10):