Tutorial

Two-D Laplace equation

1. Solve $u_{xx}+u_{yy}=0$; $0 \le x$, $y \le 1$ with $u(0,y)=10=u91,y)$ and $u(x,0)=20= u(x,1)$. Take h=0.25 and apply Liebmann method to 3 decimal accuracy.

2. By Iteration method, solve the Laplace equation $u_{xx}+u_{yy}=0$, over the square region, satisfying the boundary conditions.

   $u(0,y)=0,$ $0 \le y \le 3$
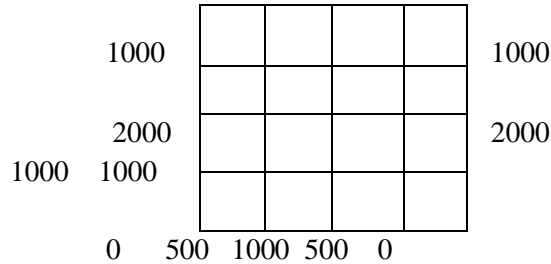
   $u(3,y)=9+y$, $0 \le y \le 3$

   $u(x,0)=3x,$ $0 \le x \le 3$

   $u(x,3)=4x,$ $0 \le x \le 3$

3. Solve the elliptic equation $u_{xx}+u_{yy}=0$ for the following square mesh with boundary values as shown:

   0   500   1000 500   0

Two-D Poisson equation:

4. Solve the Poisson equation $\nabla^2= -10(x^2+y^2+10)$ over the square mesh with sides x=0, y=0, x=3 and y=3 with u=0 on the boundary and mesh length 1 unit.