Code of 2D steady state heat Diffusion equation

```
%Define Variables
L=1;      %Length of the Rod
W=1;
nx=20;    %Number of grid points
ny=20;
dx=L/(nx-1); %Grid Spacing
dy=W/(ny-1);
u=4;
v=5;
alpha= 0.000113;     %Thermal diffusivity
dt=0.1;       %Time Step

%Maximum number of time step
Max_time_steps=5000;

%Initial tempearture vector
T=zeros(nx,ny);

x=linspace(0,L,nx);
y=linspace(0,W,ny);
%boundary conditions
T(:,1) = 120; %left boundary
T(:,ny) = 25; % right boundary
T(1,:) = 30; %upper boundary
T(nx,:) =90; %lower boundary

%Given 30 to all element of matrix
for i=2:nx-1
    for j=2:ny-1
        T(i,j)=30;
    end
end



%Iterate over time steps
for t=0:Max_time_steps
    for i=2:nx-1
        for j=2:ny-1;

        Tn=T(i,j+1);
        Ts=T(i,j-1);
        Tl=T(i-1,j);
        Tc=T(i,j);
        Tr=T(i+1,j);
        T(i,j) = Tc+alpha*dt*(dy^2*(Tl-2*Tc+Tr)+dx^2*(Tn-2*Tc+Ts))/(dx^2*dy^2)
        end
    end
end

%Plot the Graph
contourf(x,y,T);
colorbar
xlabel('x');
ylabel('y');
title('Temperature vs distance graph for steady State');
```

Graph:
Dt = 0.1
Time step = 10000
Mesh = 1*1
T_left = 120
T_Right = 25
T_Top = 30
T_Bottom = 90