2 D steady state force convection in sq. cavity with corner heat source

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% Parameters
Lx = 1;      % length of domain in x-direction
Ly = 1;      % length of domain in y-direction
Nx = 50;     % number of grid points in x-direction
Ny = 50;     % number of grid points in y-direction
dx = Lx/Nx;  % grid spacing in x-direction
dy = Ly/Ny;  % grid spacing in y-direction

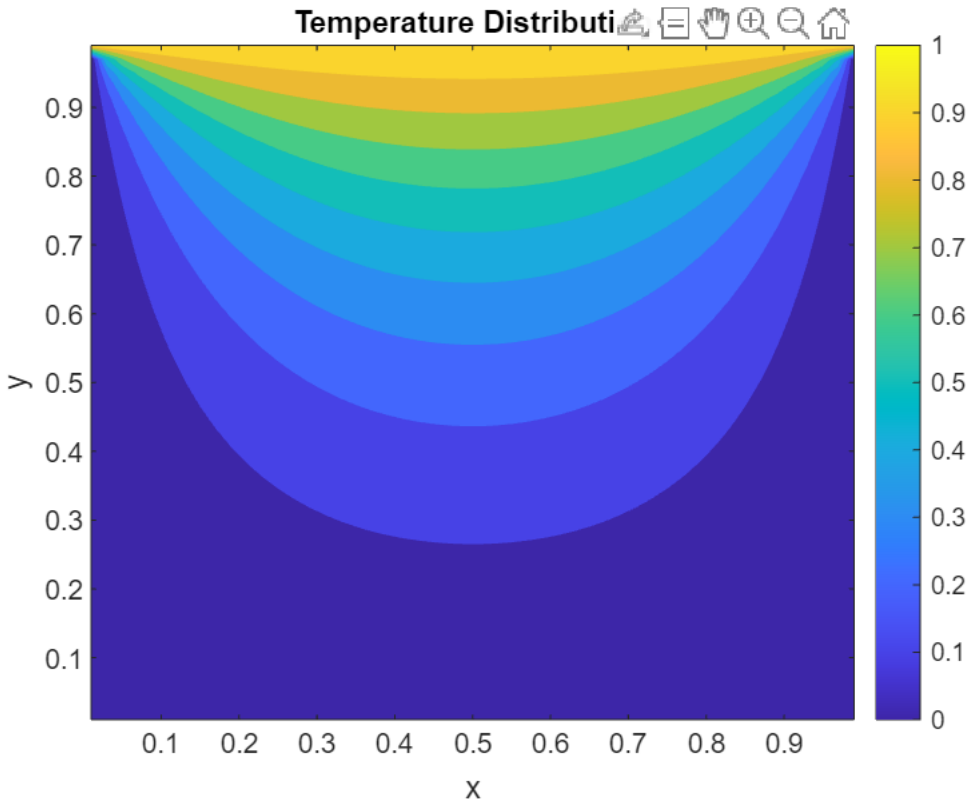
k = 0.1;     % thermal conductivity of fluid
rho = 1000;  % density of fluid
mu = 1;      % viscosity of the fluid in (Pa.s)
cp = 4184;   % specific heat of fluid

% condition of fluid
U = 0;
v = 0;
T_L = 0;      % temperature at left boundary
T_R = 0;      % temperature at right boundary
T_T = 0;      % temperature at top boundary
T_B = 1;      % temperature at bottom boundary
tol = 1e-6;   % convergence tolerance
maxit = 10000;% maximum number of iterations

%% Set up initial conditions
T = zeros(Ny,Nx);  % temperature matrix
T(:,1) = T_L;      % left boundary
T(:,Nx) = T_R;     % right boundary
T(1,:) = T_T;      % top boundary
T(Ny,:) = T_B;     % bottom boundary

% Solve using iterative method
for it = 1:maxit
    Told = T;
    for j = 2:Ny-1
        for i = 2:Nx-1
            T(j,i) = (1/4)*(T(j,i-1)+T(j,i+1)+T(j-1,i)+T(j+1,i))+...
                (U*dx/(2*k))*(T(j,i+1)-T(j,i-1)); % finite difference
equation
        end
    end
    err = norm(T(:)-Told(:))/norm(Told(:)); % relative error
    if err < tol % convergence check
        break
    end
end

%% Plot results
[X,Y] = meshgrid(dx/2:dx:Lx-dx/2,dy/2:dy:Ly-dy/2);
contourf(X,Y,T,'LineStyle','none');
colorbar;
xlabel('x');
ylabel('y');
title('Temperature Distribution');
```


Temperature Distributi
y
x
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0