```
%https://www.mathworks.com/help/pde/ug/heat-distribution-in-a-circular-
cylindrical-rod.html
%%%
clear all;
close all;
%%%
%KEY MODEL PARAMETERS
k = 1*10^-6; %cm^2/s
rho = 1; %unitless
cp = 1; %unitless
q = 0;
%%%
%INITIATE MODEL
tmodel=createpde('thermal','steadystate');
%%%
%DEFINE GEOMETRY
g = decsg([3 4 0 0 0.1 0.1 0 0.5 0.5 0]'); %coordinates in cm
geometryFromEdges(tmodel, g);
figure
pdegplot(tmodel, 'EdgeLabels','on')
axis equal
```
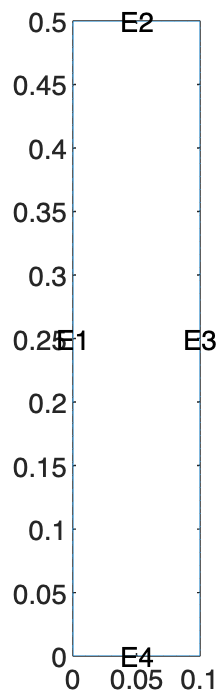


```
%%%
%DEFINE KEY PROPERTIES
thermalProperties(tmodel, 'ThermalConductivity',k,...
                         'MassDensity',rho,...
                         'SpecificHeat',cp);
```

```
%%
%DEFINE BOUNDARY CONDITIONS
thermalBC(tmodel, 'Edge',1,'Temperature',0.01);%inlet, mg/mL
thermalBC(tmodel, 'Edge',3,'Temperature',1 * exp(-7)); %outlet, mg/mL
thermalBC(tmodel, 'Edge',2,'Temperature',0); %No flux at lateral boundary
thermalBC(tmodel, 'Edge',4,'HeatFlux',0); %No flux at lateral boundary
%%
%GENERATE MESH
msh = generateMesh(tmodel);
mshpts=msh.Nodes;
figure
pdeplot(tmodel);
axis equal
```
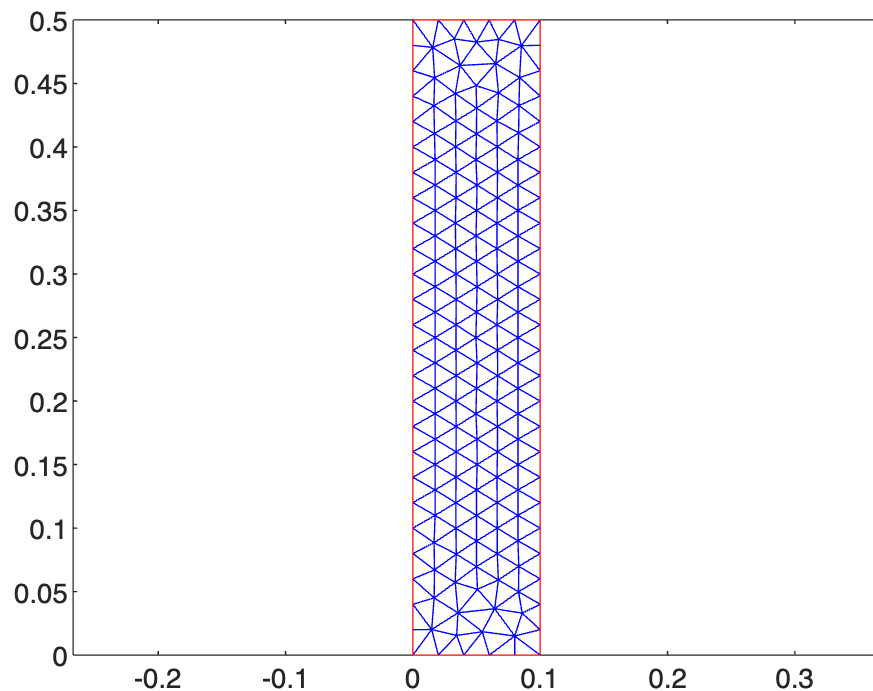


```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%SOLVE
result = solve(tmodel);
T = result.Temperature;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%PLOT SOLUTIONS
%Surface
figure
pdeplot(tmodel, 'XYData', T, 'Contour','on');
axis equal
title 'steady-state concentration'
```

steady-state concentration
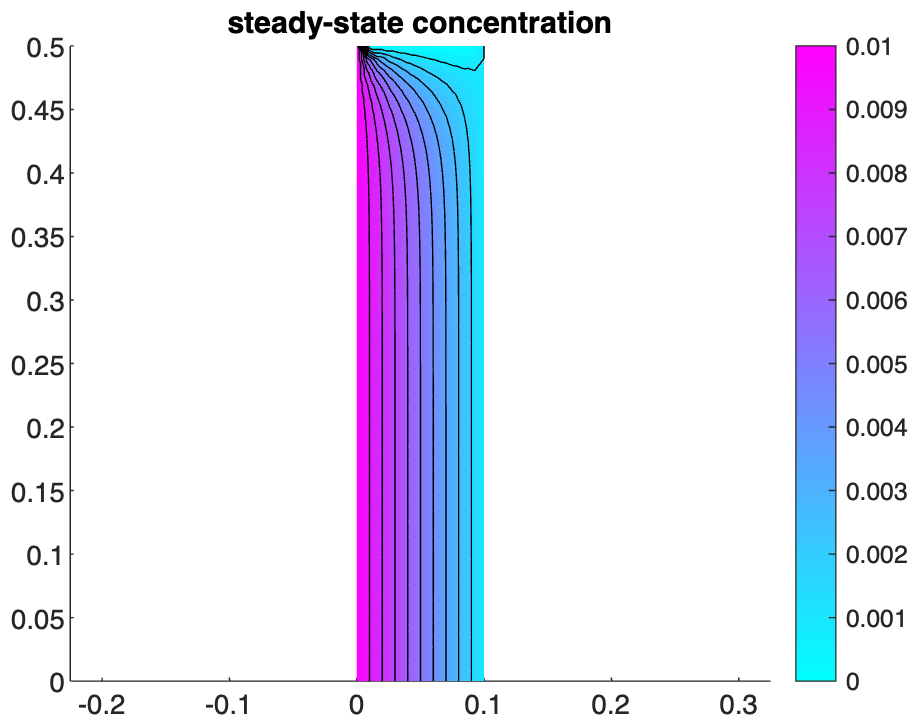
```
%Line
xrange=[0, 0.1]; %x0 and xL
yrange=[0.25, 0.25]; %y0 and yL
x=linspace(xrange(1), xrange(2), 25);
y=linspace(yrange(1), yrange(2), 25);
Tcenter = interpolateTemperature(result,x,y);
figure;
plot(x,Tcenter); xlabel('Position [cm]'); ylabel('Conc. [mg/mL]');
```