CSI 701

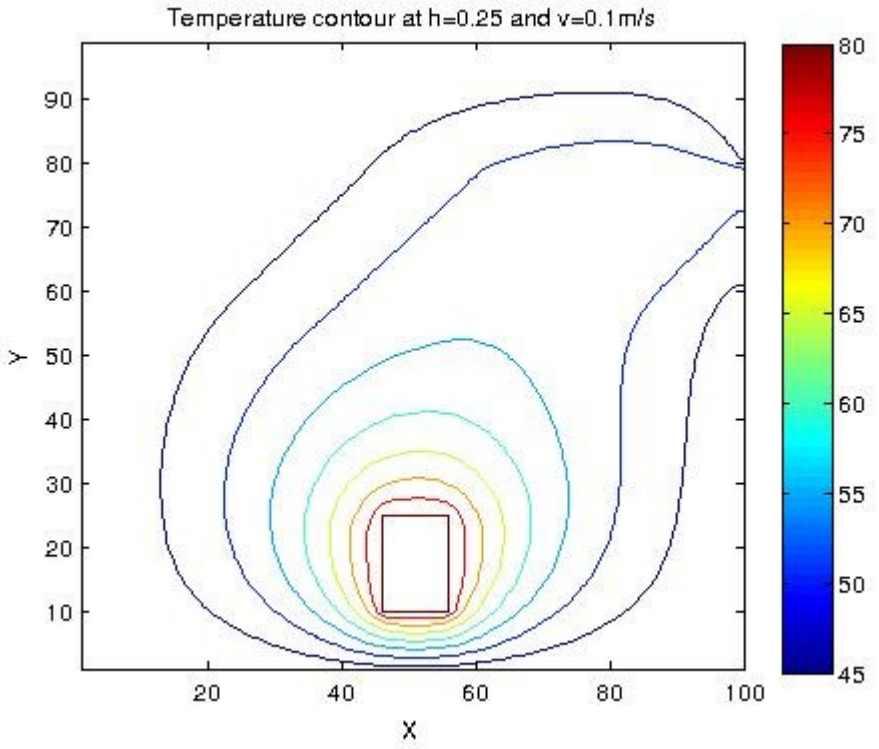
Homework-2

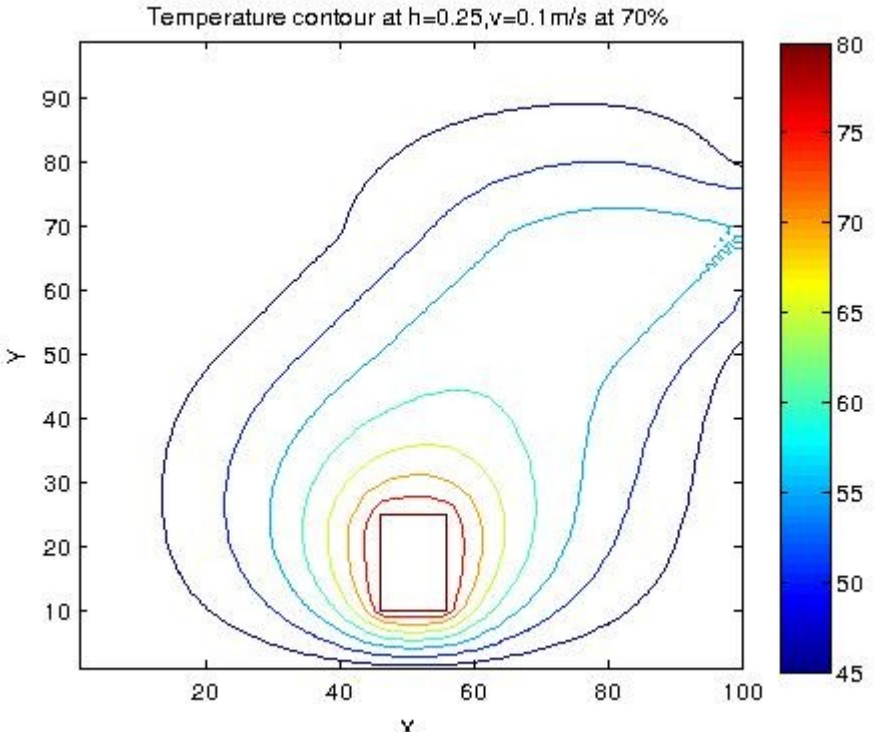
--Niamul Baqui

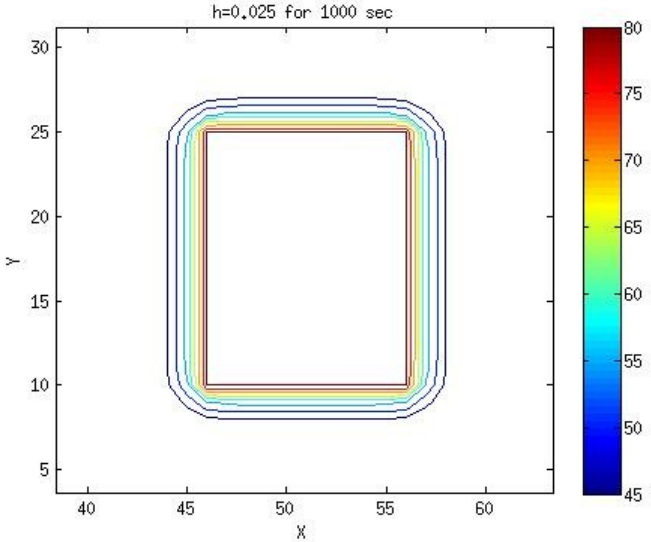
Parameters

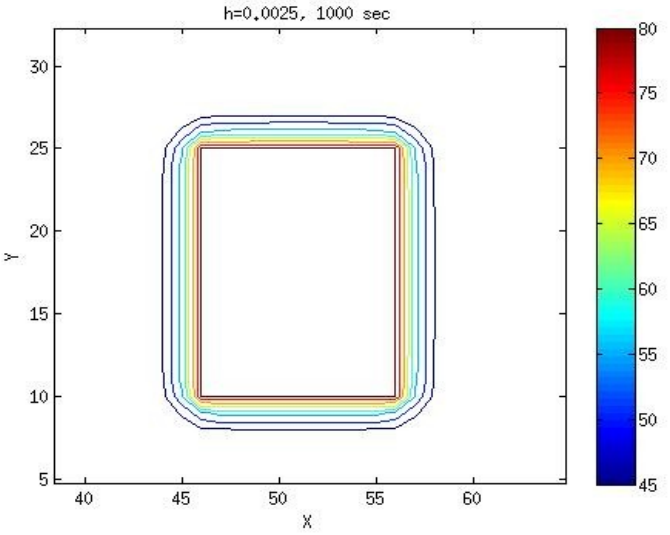
- Grid size: 100X100, Vmax=0.1 m/s, k=0.0005 Pa.s,Lx=Ly=5 m, total timestep =1000 sec
- Vessel located at 70% Y location and at 60% Y location, Needle located from 45-55% X location and 10-25% Y location
- Accuracy parameter 10e-4, Verified code with two different h at h=0.025 and h=0.0025. Similar result obtained. Results vary by 2%.
- Initial domain temperature = 40 C, Initial needle temperature=80 C
- Procedure: FDM 1st order upwind for convective term, 2nd order Central Difference for diffusive term, Forward Euler for time derivative.
- Question answered:
  - Burnt region with distance to vessel
  - Burnt region with no vessel

RESULTS


Temperature contour at h=0.25 and v=0.1m/s
Y
X
90
80
70
60
50
40
30
20
10
20
40
60
80
100
80
75
70
65
60
55
50
45


Temperature contour at h=0.25,v=0.1m/s at 70%
Y
X
90
80
70
60
50
40
30
20
10
20
40
60
80
100
80
75
70
65
60
55
50
45


h=0.025 for 1000 sec
Y
X
30
25
20
15
10
5
40
45
50
55
60
80
75
70
65
60
55
50
45


h=0.0025, 1000 sec
Y
X
30
25
20
15
10
5
40
45
50
55
60
80
75
70
65
60
55
50
45