

CS 870 – Numerical Algorithms and Image Processing

Fall 2010

Assignment

Karim Ali

Part a

Figures 1-3 show the curve evolution of the circle at grid sizes $m=20$, 40, and 80 respectively. Table 1 shows the error for each grid size m .

To re-generate those plots, you can run the following Matlab function:

`evolveCurve('circle', F, tMax, m)`

where: **F** = speed (here it's always = 1),
tMax = maximum value for time **t** (here it's always = 0.25)
m = grid size (=20, 40, 80)

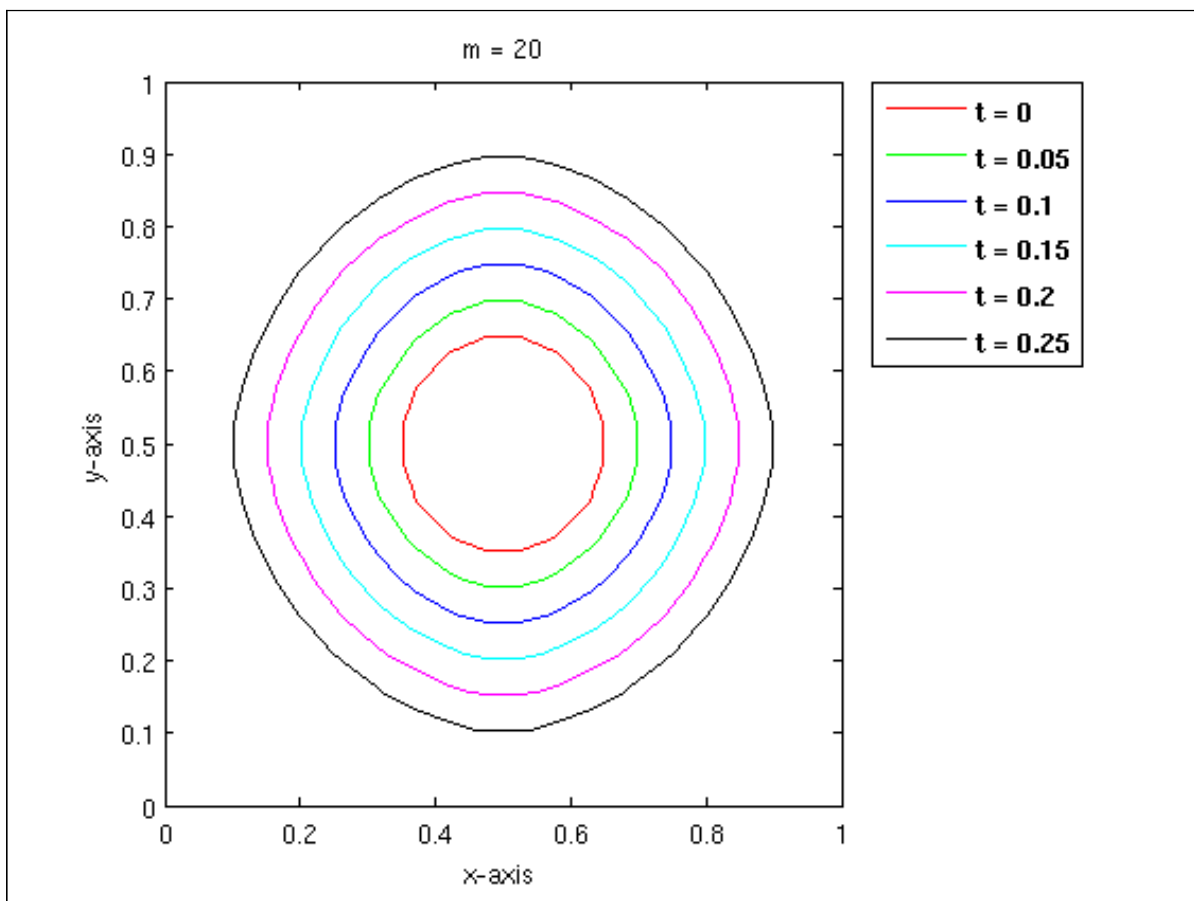


Figure 1

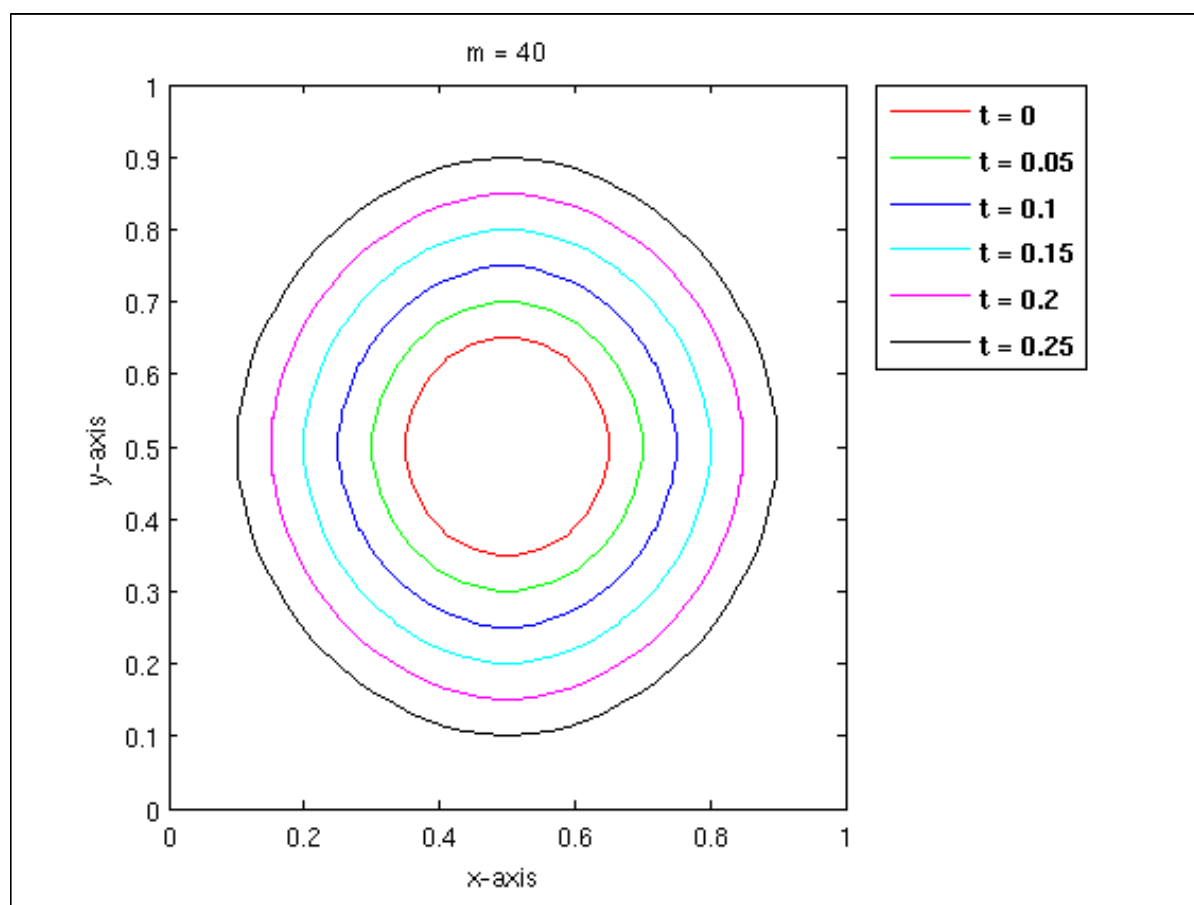


Figure 2

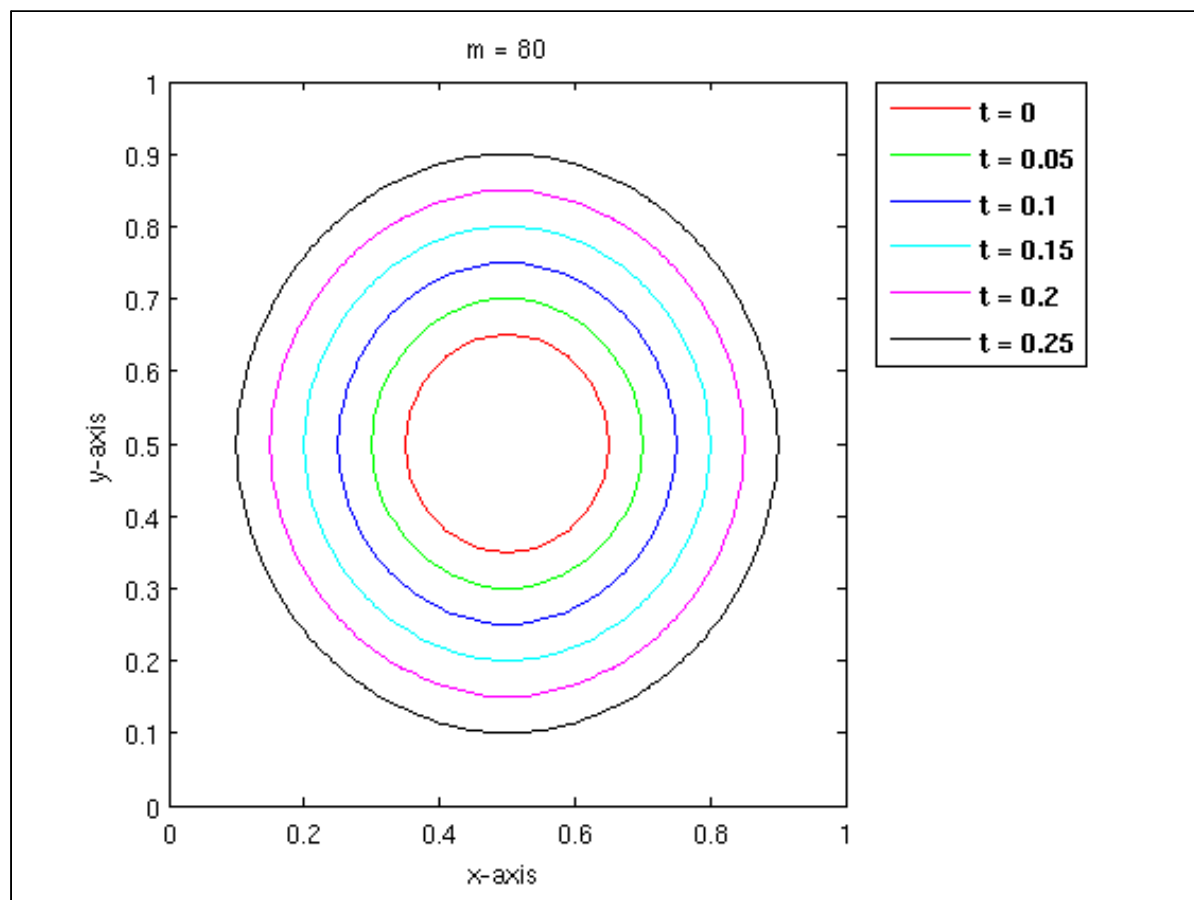


Figure 3

Table 1 shows the error ($A_{\text{exact}} - A_{\phi}$) for each grid size m .

Grid Size (m)	Error ($A_{\text{exact}} - A_{\phi}$)
20	-0.0955004
40	-0.0403150
80	-0.0258936

Table 1

Figure 4 shows a plot for the **error** versus grid size m .

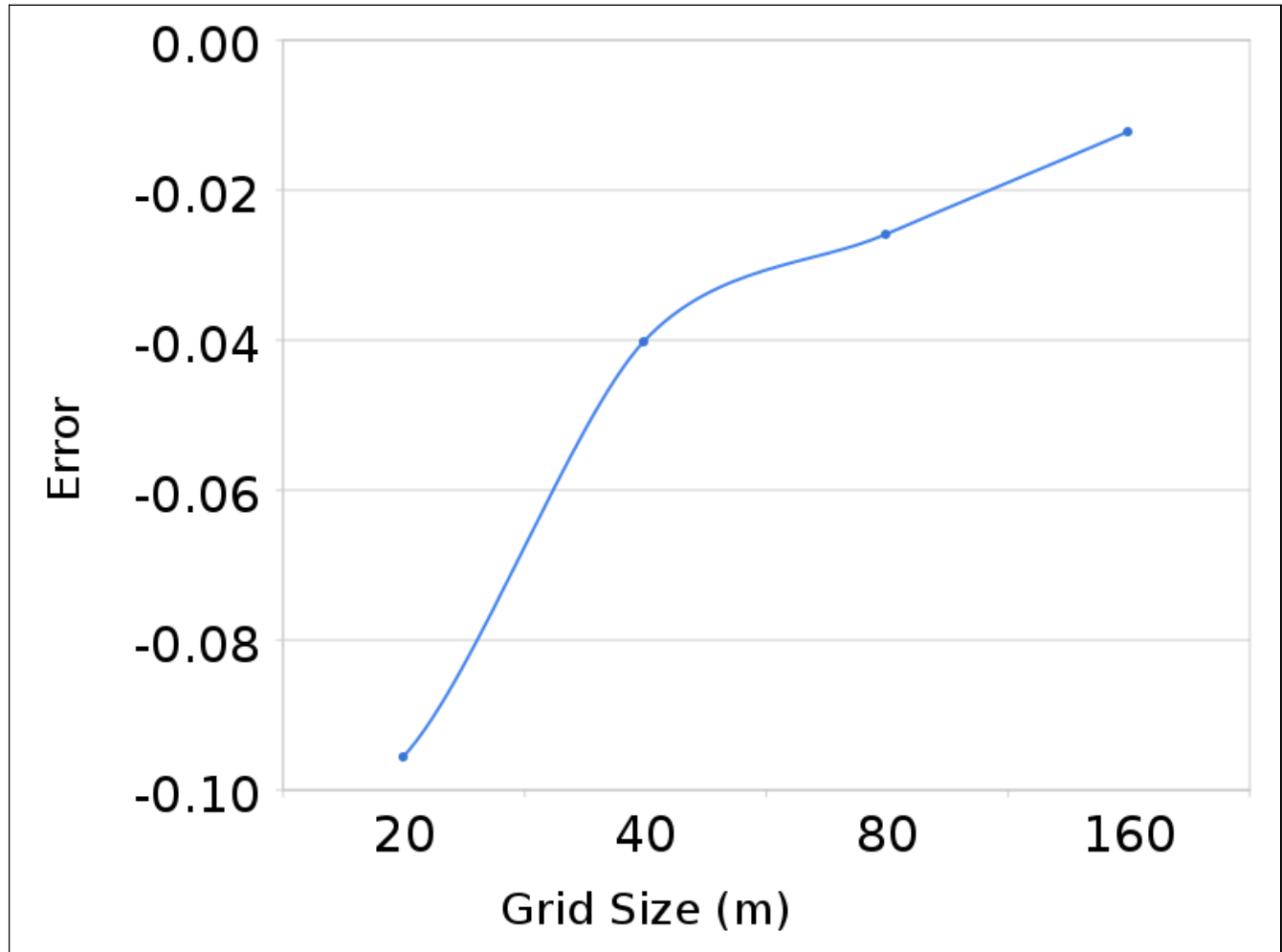


Figure 4

Part b

Figure 5 shows the curve evolution of the dumbbell at grid size $m=80$. The evolution shows that the dumbbell will split around $t = 0.1$.

To re-generate the plot, you can run the following Matlab function:
`evolveCurve('dumbbell', -1, 0.25, 80)`

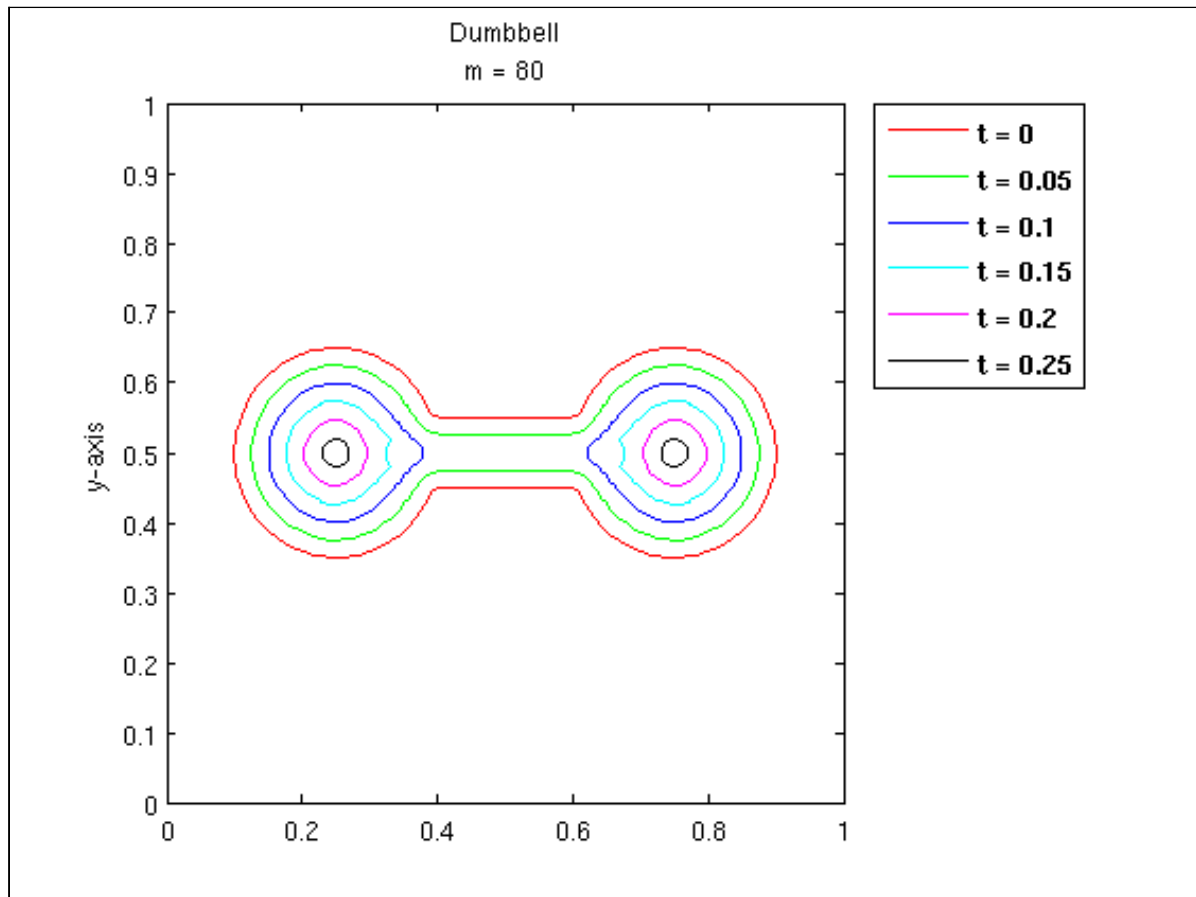


Figure 5