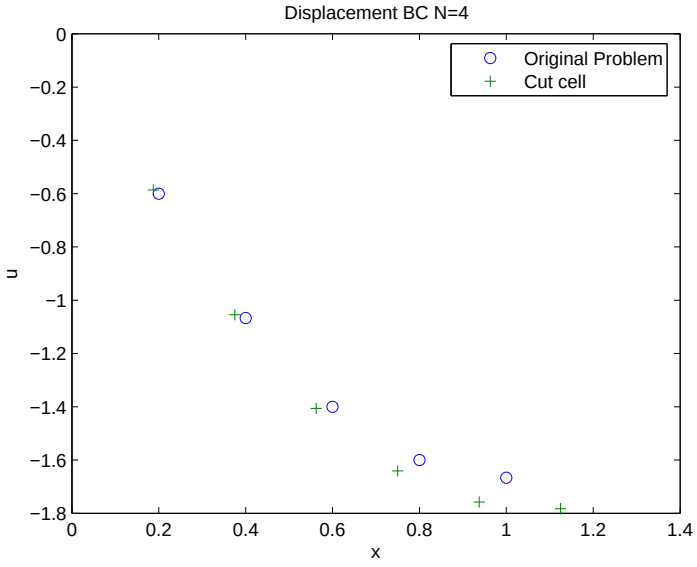
1 Problem 1

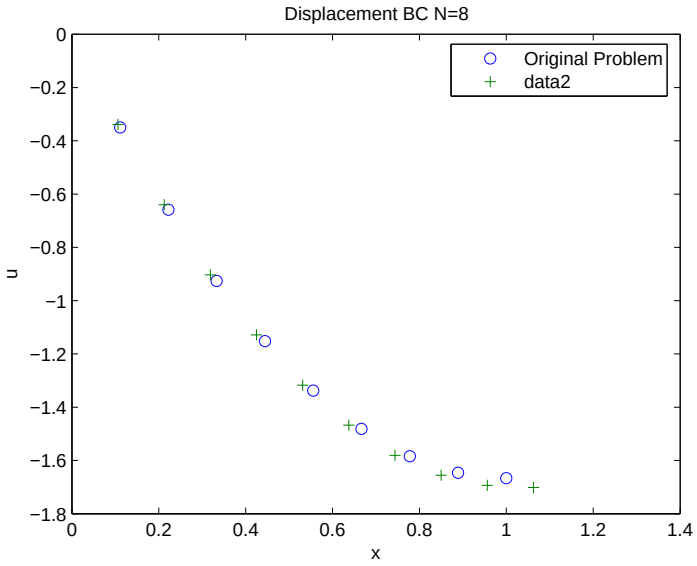
1.1 Description

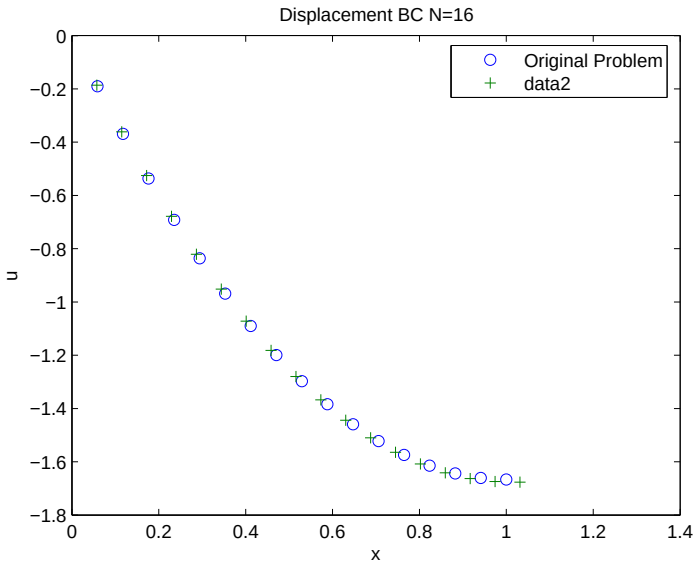
We want to solve the following BVP:

$$\begin{aligned} Au_{,xx} &= K, \\ A &= 3, \\ K &= 10, \\ u_{x=0} &= 0, \\ 0 &< x < L, \\ L &= 1. \end{aligned}$$

1.2 Results




Displacement BC N=8
Original Problem
data2
u
x
0
−0.2
−0.4
−0.6
−0.8
−1
−1.2
−1.4
−1.6
−1.8
0.2
0.4
0.6
0.8
1
1.2
1.4


Displacement BC N=16
Original Problem
data2
u
x
0
−0.2
−0.4
−0.6
−0.8
−1
−1.2
−1.4
−1.6
−1.8
0.2
0.4
0.6
0.8
1
1.2
1.4

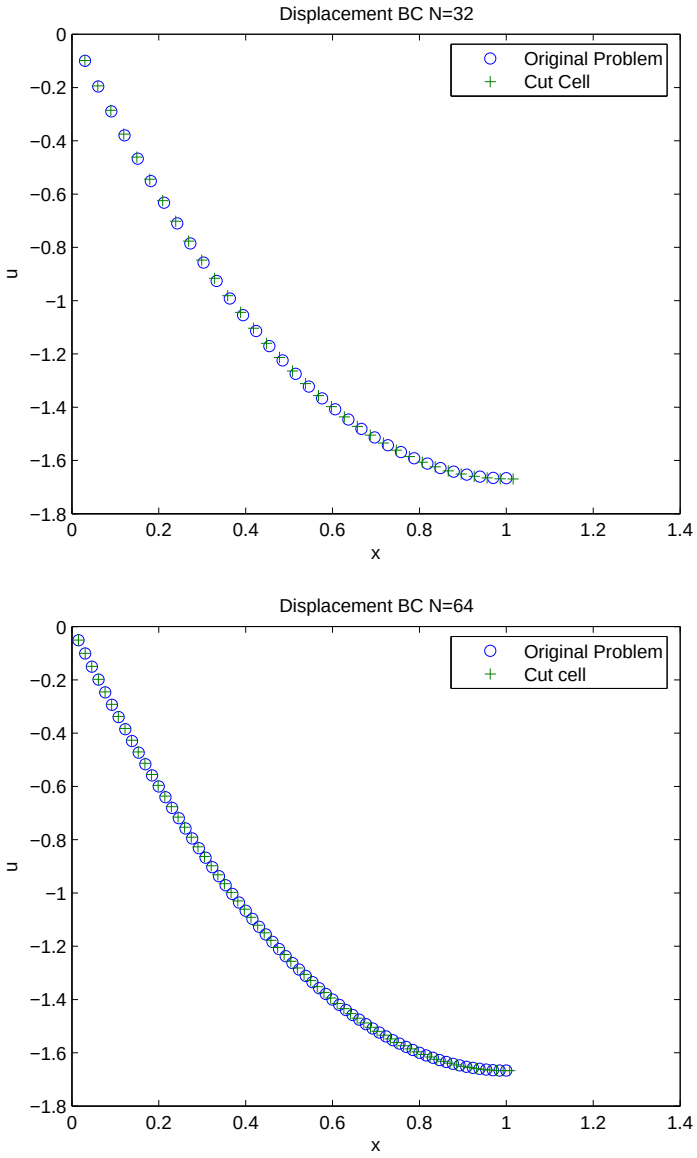


Figure 1: Convergence study for regular FEM vs. Cut Cell[1]

[1]The numerical integration of the last element is reduced to one gauss point.

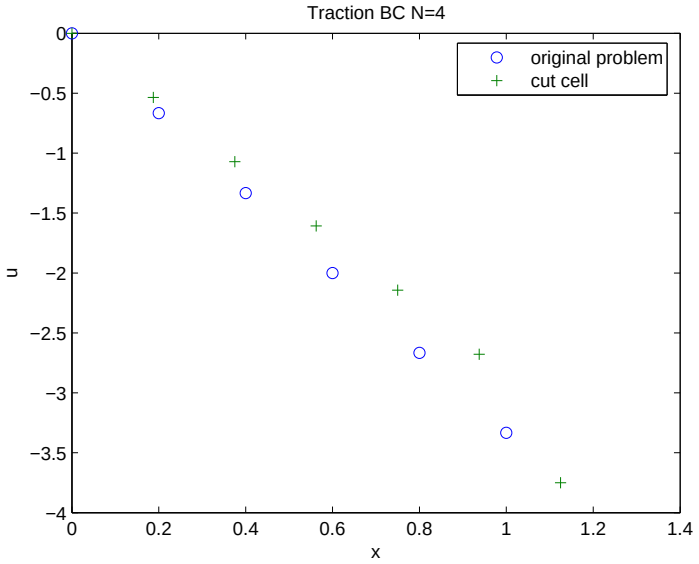
2 Problem 2

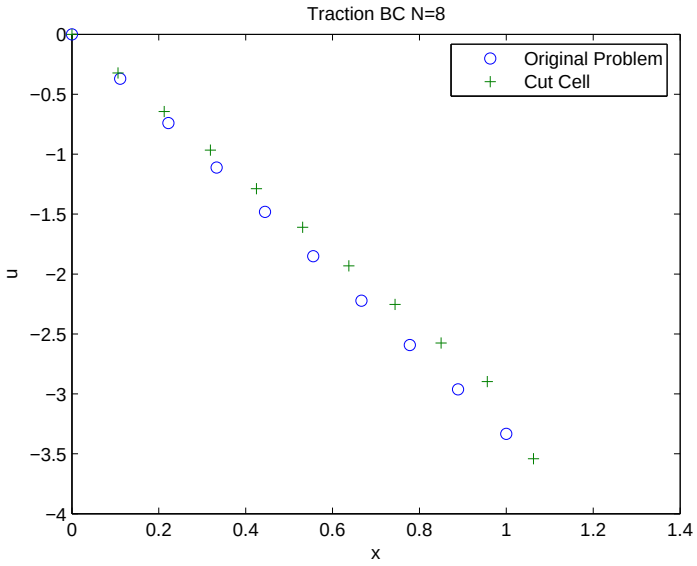
2.1 Description

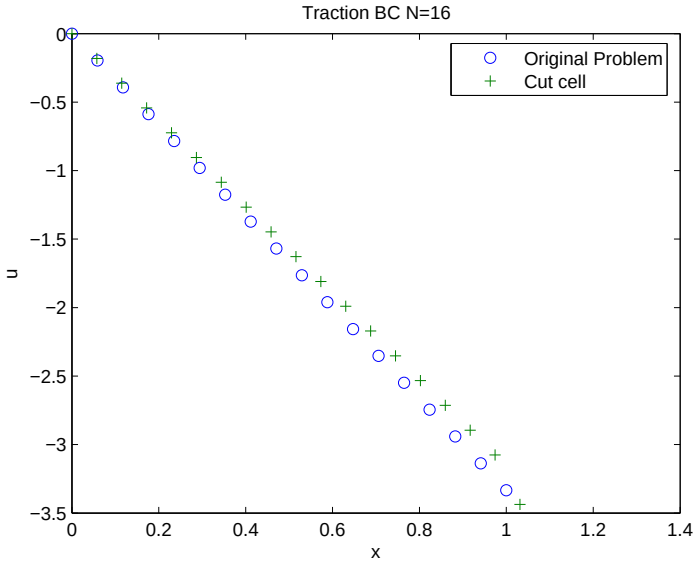
We want to solve the following BVP:

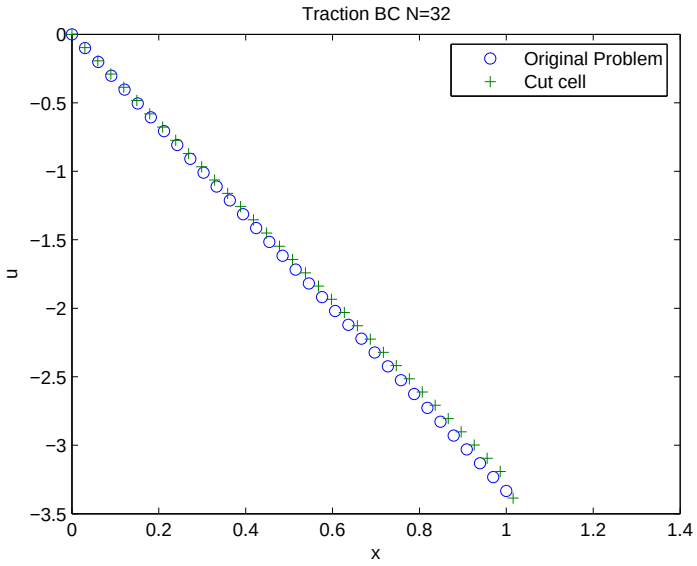
$$\begin{aligned} Au_{,xx} &= 0, \\ A &= 3, \\ u_{x=0} &= 0, \\ 0 &< x < L, \\ L &= 1, \\ Au_{,x}|_{x=L} &= N, \\ N &= -10. \end{aligned}$$

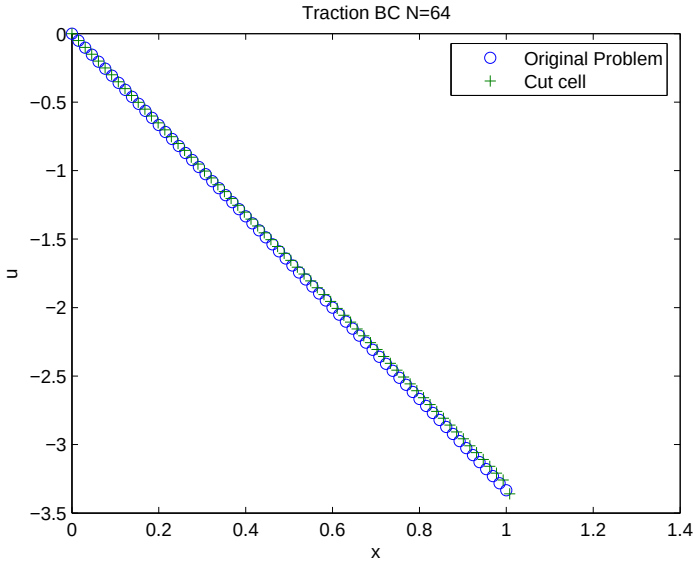
2.2 Results




Traction BC N=8
Original Problem
Cut Cell
u
x
0
−0.5
−1
−1.5
−2
−2.5
−3
−3.5
−4
0
0.2
0.4
0.6
0.8
1
1.2
1.4


Traction BC N=16
Original Problem
Cut cell
u
x
0
−0.5
−1
−1.5
−2
−2.5
−3
−3.5
0
0.2
0.4
0.6
0.8
1
1.2
1.4


Traction BC N=32
Original Problem
Cut cell
u
x
0
−0.5
−1
−1.5
−2
−2.5
−3
−3.5
0
0.2
0.4
0.6
0.8
1
1.2
1.4


Traction BC N=64
Original Problem
Cut cell
u
x
0
−0.5
−1
−1.5
−2
−2.5
−3
−3.5
0
0.2
0.4
0.6
0.8
1
1.2
1.4

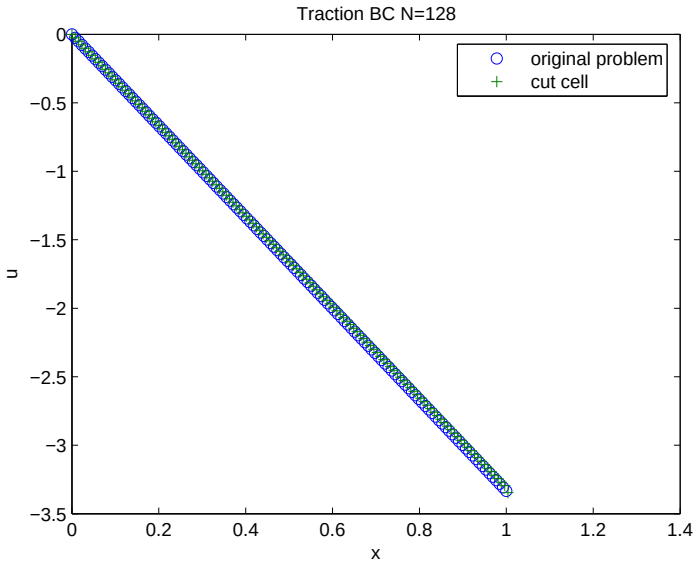


Figure 2: Convergence study for regular FEM vs. Cut Cell