National Taiwan University **Finite Element Method**

Department of Civil Engineering Instructors: C.-S. CHEN

Lab Assignment 8, 05/23/2019, 1800 -- 2000

Due 2000

Lab Grading Policy: Attendance 20%, Score 80%, Bonus 20%

In case you have difficulty in finishing the exercises on time, you should upload them before **2100 on Saturday** and a penalty of 20% discount will be applied on your score. No late submission after 2100 on Saturday is permitted. We will in general post the reference solutions **by Sunday**.

Download from the course website and unzip it. You will find a folder containing and files with seven functions,

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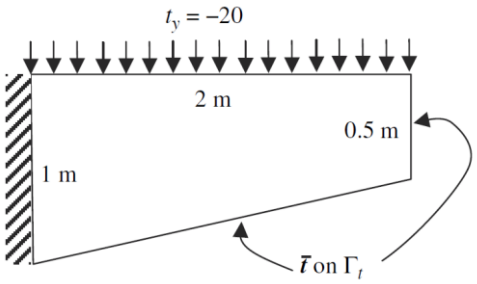
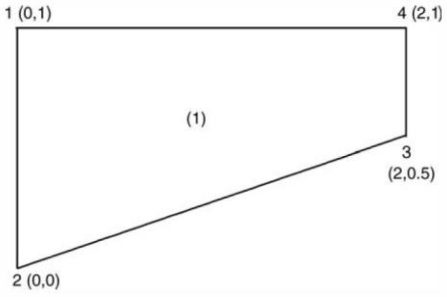
1. (80%) Consider the same trapezoidal panel given in the Lecture. The vertical left edge is fixed. The bottom and the right vertical edges are traction free. Traction $t_y = -20$ Nm^{-1} is applied on the top horizontal edge. Material properties are Young's modulus $E = 3\times10^7$ Pa, Poisson's ratio $\nu = 0.3$ and thickness = 1 m. Plane stress conditions are considered.

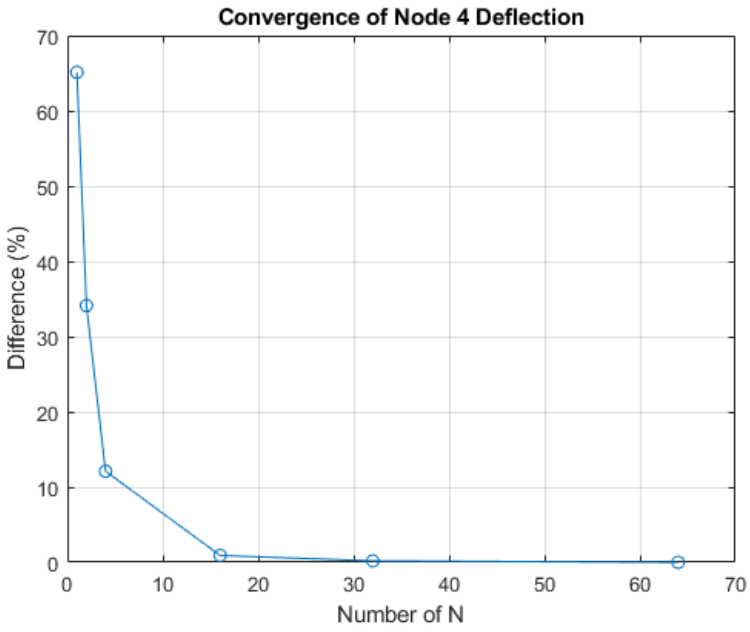


Write an interactive preprocessor to discretize the domain using bilinear Q4 quadrilateral elements and output the displacements. Below is a sample run:

2. **(Bonus, 20%)** You should finish Problem 1 first. Conduct a convergence study on Problem 1 by setting N = M and change N from 1, 2, 4, 16, 32, 64, 128. Monitor the deflection along the y direction on node 4. Use the answer from N = 128 as your reference solution and plot the difference in % in the y-axis and N in the x-axis.



Below is a sample plot:


Convergence of Node 4 Deflection
Difference (%)
Number of N
0
10
20
30
40
50
60
70