Zach Dischner

ASEN 5007 Introduction To Finite Elements - Fall 2013

Homework Assignment #3   Chapters 6–7 of Notes

Due Tuesday Sep 24, 2013 for on-campus students; Sep 26 for CAETE students

Please dont forget to attach this cover sheet to your returned homework and write your name(s) on it

Exercises:

7.1 (easy, about one minute)

7.2 remember that *no triangles are allowed* when you draw a mesh within region ABCD. Several acceptable solutions with quadrilaterals are possible; some are a bit tricky.

7.3

7.4 (long by hand, may be helped by computer (Matlab, Mathematica, etc) or programmable calculator)

7.7 (see Notes below)

Grading weights: given at the start of each Exercise.

Note 1: please do all necessary sketches for 7.1, 7.2 and 7.7 on your own paper. Engineering paper should be used. You should start each Exercise on a new page to help grading, but don't need to start a new page for items of an Exercise.

Note 2: For 7.7(d) and 7.7(e) truncate the mesh at a sufficiently large distance from the loads. (The mesh should occupy a rectangular region and use rectangular elements, since that is easy to draw). No need to use infinite elements, but be careful that vertical rigid-body motions be restrained as necessary. As regards what BC to place on truncated boundaries, use your judgement.

Contents

```
%>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
%                      quickFEM.m
% Author     : Zach Dischner
% Date       : 9/24/2013
% Description : quick Matlab checker script for Problem 4, HW 3
%
%                   __..._____              ,
%              `(\ [ ===NCC-1700===--|__|) ___..--"_`--.._____
%                `"""""""""""""""| |""`  [_""_-_____"_/
%                                | |   /...../`'-._._.-'`
%                           ____| |__/::...'_
%                          |\ ".`"` '_____//\
%                           `"'-.    """"" \\/
%                              `"""""""""`
% <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
```

Part 1, the X forces

```
d = 180-[180 136 84 36 0];
pp=62.4;
p = pp*d;
p = [0 p 0];
d = [0 d 0];
L = (d - [d(end) d(1:end-1)]); L(L<0) = 0;
for ii = 2:length(p)-1
    Fx(ii-1) = computeLoadEbE(p(ii-1),p(ii), p(ii+1),L(ii),L(ii+1));
end
fprintf('Computed X Node loads are:\n')
Fx
```

```
Computed X Node loads are:

Fx =

  Columns 1 through 3

            20134.4                139776                295360

  Columns 4 through 5

            366912              188697.6
```

Part 2, the Y forces

```
d = [0 70 210 350 490];
p = -1*ones(length(d),1)'*180*pp;
p = [0 p 0];
d = [0 d 0];
L  = d - [d(end) d(1:end-1)]; L(L<0) = 0;
for ii = 2:length(p)-1
    Fy(ii-1) = computeLoadEbE(p(ii-1),p(ii), p(ii+1),L(ii),L(ii+1));
end
fprintf('Computed Y Node loads are:\n')
Fy
```

```
Computed Y Node loads are:

Fy =

     -393120    -1179360    -1572480    -1572480     -786240
```

Published with MATLAB® R2013b