CEE2333

Term Project

The problem that you will solve is a hollow tube loaded by a vertical pressure at a portion of the surface:
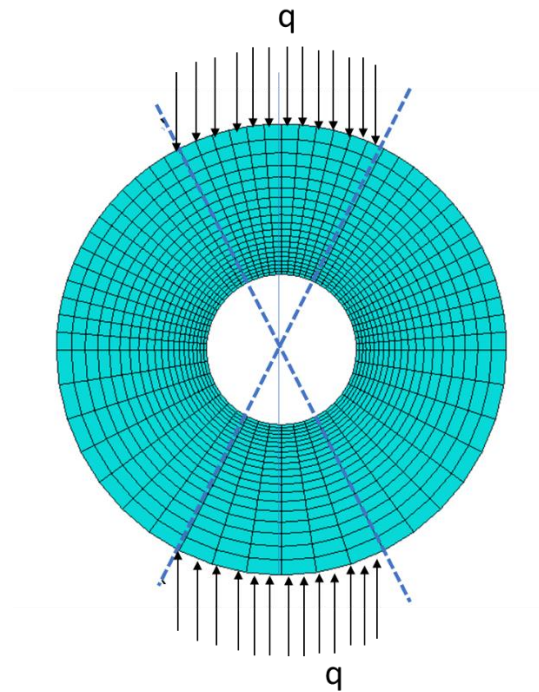

Figure 1: Model and problem

You need to adapt the code for bi-linear elements you developed for your homework problems to enable the analysis of this problem.

Analyze the problem using two finite element models:

- The entire structure
- A quarter of the structure

For both cases, the user should be able to select either full or reduced integration bilinear elements.

Extra credit: allow the user to select a quadratic element.

You should write a pre-processor in MATLAB to discretize the model. Your input parameters should include the external and internal radii of the tube, the angle of the loaded portion of the surface, the number of elements in the radial direction, the number of elements in the tangential direction, the material properties, and the magnitude of the applied pressure.

Finally, you will need to ensure that your program reports the results. The program should

- Print displacements and stresses to a CSV file
- Plot the displacement fields

Contents of the Term Project report must include:

1. Report
   1.1. Title (cover page)
   1.2. Table of contents
   1.3. Introduction (a brief description of the problem and objectives of the analysis)
   1.4. Model (finite element mesh, material properties, loading, boundary conditions, etc.)
   1.5. Numerical analysis (with figures and/or tables)
   1.6. Discussions
   1.7. Conclusions

   At least 10 pages for items 1.3-1.6 are expected.

2. All code in a single ZIP file

Evaluation criteria:

1. Correctness of the FEM model (40%)
   a. Preprocessor (10%)
   b. Stiffness matrices (10%)
   c. Stress calculation (10%)
   d. Postprocessor (printing and plotting) (10%)
2. Code documentation with sufficient comments (10%)
3. Analysis and discussion (30%)
4. Report (20%)