

ME 712 Lab 1: 3-Dimensional Brick Element Due May 30

1. Write a general code to generate the elemental stiffness matrix for a single brick element for WFEM.
2. Write a code to generate the elemental mass matrix.
3. Obtain the FE matrices K in global coordinates.
4. Write a subroutine to assemble these elements into a global matrix.
5. Write a subroutine to apply specified boundary conditions (imposed displacements).
6. Write a subroutine to solve for the entire displacement vector.
7. Test your code on the following: Find the tip displacement of a vertical post to a 10nN transverse tip load for the following structures:
 - (a) Pyramid: height 190nm, bottom side length 74nm, flat top side length 10nm
 - (b) Height 190nm, bottom diameter 74nm, flat top diameter 10nm.
8. Compare your results to a beam model using your beam code, and results using your favorite commercial finite element code. Explain discrepancies.
9. Work in groups of two.

Be sure to write your code in a modular form to make debugging easier. Make sure to comment your code as well. Turn in the results of all of your analyses as well as the code. tar.zip (tgz), or PC zip all files and email them to me.