

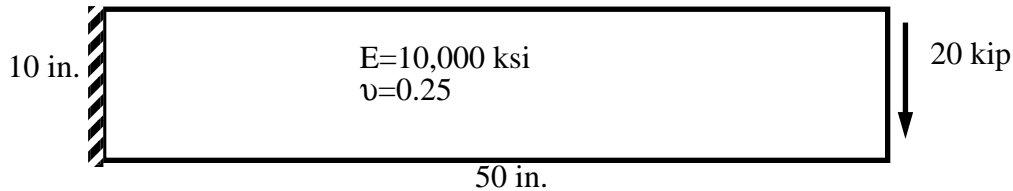
**CE 222— FINITE ELEMENT METHODS**

**PROBLEM SET #6**

Use FEDEAS/222 with the CST element to perform a finite element analysis for the following problems.

**Problem 1**

Analyze the cantilever considered in class except assume the tractions are *uniformly* distributed (not a quadratic distribution. Compute the equivalent nodal loads for the uniform traction.

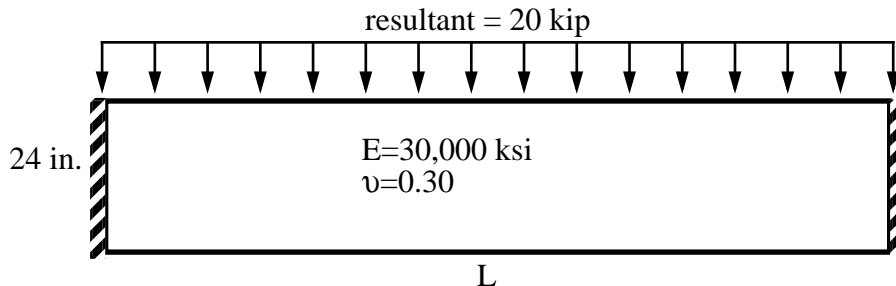


Consider the following cases: (1) tangential traction specified at fixed end, and (2) tangential displacement zero at fixed end.

For each case examine the convergence of the solution as the element size is decreased. Discuss the effect of the boundary condition at the fixed end on the stresses and displacements.

**Problem 2**

The beam is fixed at both ends (with zero tangential and normal displacement) and subjected to a uniform normal traction on the upper boundary. The resultant of the normal traction is 20 kip. Use symmetry to analyze a model of one-half of the beam.



Consider the following cases: (1) shallow beam with  $L=240$  in., and (2) deep beam with  $L=72$  in.

For each case examine the convergence of the solution as the element size is decreased. Discuss differences in the stress distribution between the deep beam and shallow beam.

**Problem 3**

The deep beam in Problem 2 is haunched. Examine the effect of the haunch on the displacement and stress distribution. Use symmetry to analyze one-half of the beam.

