2.094 Finite Element Analysis of Solids and Fluids
Spring 2008

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FINITE ELEMENT ANALYSIS OF SOLIDS AND FLUIDS

SPRING 2008

Homework 1

Instructor: Prof. K. J. Bathe

Assigned: 02/07/2008
Due: 02/14/2008

Problem 1 (10 points):

Consider the sheet of material shown.
Here

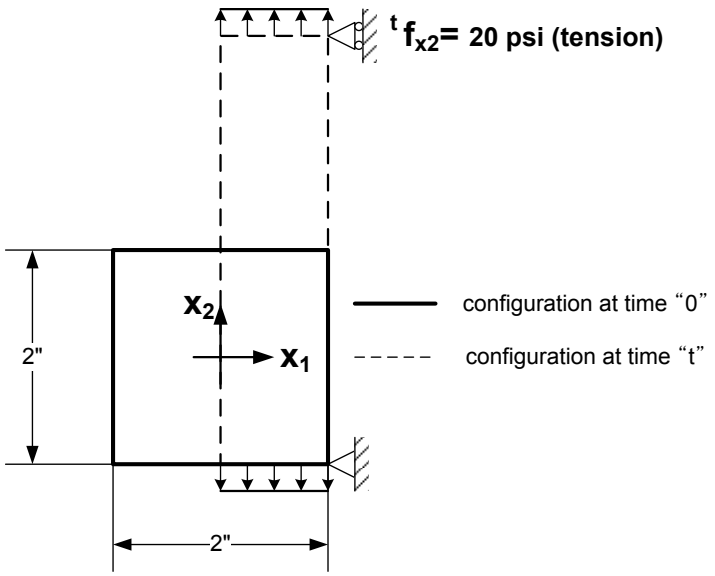
$$^{t}u_1 = -\frac{^{0}x_1}{2} + \frac{1}{2}$$

$$^{t}u_2 = {}^{0}x_2 + 1$$

Also, the stresses are

$$^{t}\tau_{11} = 0$$
$$^{t}\tau_{22} = 20\ psi$$
$$^{t}\tau_{12} = 0$$

Identify three simple independent virtual displacement patterns and show that the principle of virtual work is satisfied for these patterns.



Problem 2 (20 points):

Solve Problem 2 of the AUI Primer in ADINA (You can find the AUI Primer under the Help menu). Then change the elements to 4-node elements and compare the results.

Note: To change the elements, just delete the previous mesh and remake the mesh using 4-node elements by setting “Nodes per element” to 4 (default value is 9 as used in the example).

Compare the calculated stresses with the two meshes along the two symmetry lines and discuss your results with a few sentences.