

2.094

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

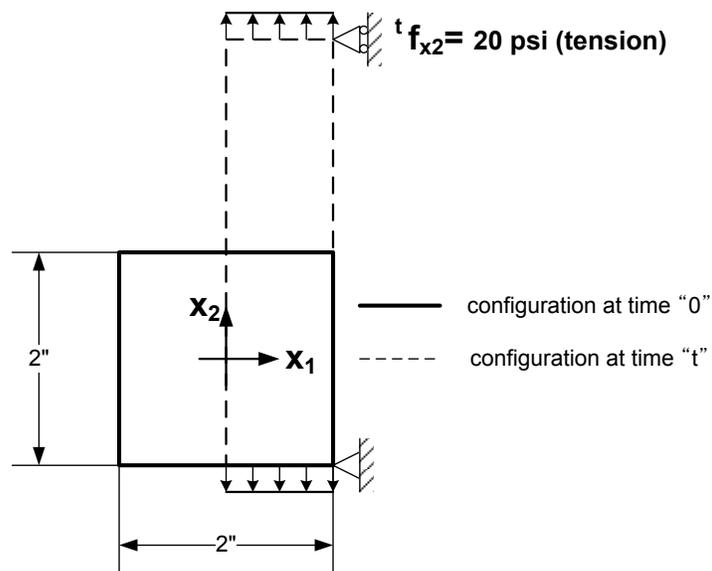
$${}^t u_1 = -\frac{{}^0 x_1}{2} + \frac{1}{2}$$

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

Also, the stresses are

$$\begin{aligned} {}^t \tau_{11} &= 0 \\ {}^t \tau_{22} &= 20 \text{ psi} \\ {}^t \tau_{12} &= 0 \end{aligned}$$

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.

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