AEE 361 – Fall 2009 Section: ___ Name: _____
Homework 3
Due: Wednesday November 2, 2009

COVER SHEET

- HW is to be turned in with the cover sheet filled out and signed.
- HW is due before class one week after it is handed out.
- Use the systematic solution technique presented in class.

I have completed this assignment on my own. I did not *copy* the solutions from anyone or any other source.

☐ I collaborated on this assignment with:

_____ _____

_____ _____

_____ _____

☐ I looked at the solutions from other sources after I worked on the problem and made the necessary corrections.

Signature: _____

No member of this class shall take unfair advantage of any other member in this class.

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2.1 (U&F) Determine whether the following strain fields are possible in a continuous material.

(a) $\begin{bmatrix} c(x^2+y^2) & cxy \\ cxy & y^2 \end{bmatrix}$

(b) $\begin{bmatrix} cz(x^2+y^2) & cxyz \\ cxyz & y^2z \end{bmatrix}$

Here c is a small constant, and it is assumed that $\varepsilon_{zz} = \gamma_{xz} = \gamma_{yz} = 0$.

2.2. (U&F) Rectangle ABCD is scribed on the surface of a member prior to loading. Following the application of the load, the displacement field is expressed by

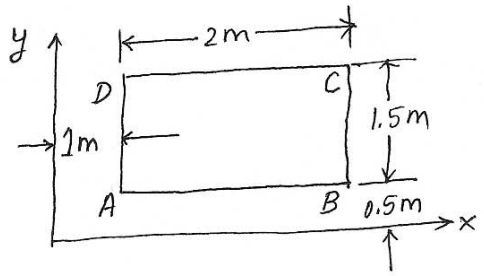
$$u = c(2x+y^2), \quad v = c(x^2-3y^2)$$

where $c = 10^{-4}$. Subsequent to the loading, determine

(a) the length of the sides AB and AD.

(b) the change in the ~~length~~ angle between sides AB & AD.

(c) the coordinates of point A.



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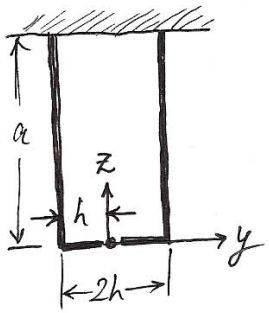
2.40 (U8F) A uniform bar of rectangular cross-section $2h \times b$ and specific weight γ hangs in the vertical plane. Its weight results in displacements:



$$u = -\frac{\nu\gamma}{E} xz$$

$$v = -\frac{\nu\gamma}{E} yz$$

$$w = \frac{\gamma}{2E}\left[(z^2 - a^2) + \nu(x^2 + y^2)\right]$$

Demonstrate whether this solution satisfies the 15 equations of elasticity and the boundary conditions

2.37 The stress field in an elastic body is given by

$$\begin{bmatrix} cy^2 & 0 \\ 0 & -cx^2 \end{bmatrix}$$

where c is a constant. Derive expressions for the displacement components $u(x,y)$ and $v(x,y)$ in the body.