Homework 5

Date Assigned: 10/17/05
Date Due: 10/24/05 (Or 11/2/05)

Text problems: 6.3, 6.18 (Use von Mises criterion - book answer may be slightly different from yours because it doesn’t use thin-wall approximation).

Non-text problem:

Use the structure in figure 1 for this problem, with the values in table 1. Perform the following tasks:

1. Compute the maximum von Mises (Distortion Energy Theory) equivalent stress at the support and the tip of the structure in figure 1.
2. Assume that the structure was designed to support the stresses in item 1. How large can “a” be without having to change the design to accommodate larger stresses? Solve this analytically (by hand). (Answer: \(a_{max} = 33\) cm - think about it).
3. Use Matlab to write a program that solves for item 2 automatically. You must use the Matlab function “fsolve” in your code (type “help fsolve” in Matlab for more info). Check that your code works by plugging in the values for item 2 and running it. Also, check that \(a_{max} = 19.605\) cm if \(T_2 = 7\) kN, \(d = 1.5\) cm and \(P = 0.15\) kN. I will check some random configurations to make sure your code is correct. See the back for some Matlab specifications.

![Figure 1: Structure for non-text problem](image)

Table 1: Values for non-text problem

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
<td>d</td>
<td>L</td>
<td>P</td>
<td>F</td>
<td>T_1</td>
</tr>
<tr>
<td>---</td>
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<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
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</tr>
<tr>
<td>20 cm</td>
<td>7 cm</td>
<td>2 cm</td>
<td>40 cm</td>
<td>0.1 kN</td>
<td>1 kN</td>
<td>10 kN·cm</td>
</tr>
</tbody>
</table>
Matlab Rules

1. You must email me your file(s) as an attachment. If it is embedded in the email, it will not be accepted and will be considered late until it is properly emailed.

2. Check your files. If they do not run (i.e. they have errors) I will not spend any time fixing them and you will get a zero for that part of the assignment. If they run and give wrong answers, you will get partial credit.

3. The filename(s) must be “name_hw#_description.m”

4. You must comment the files so I can see what you are doing.

See the class website for Handout 7, which shows you how to write a function in Matlab.