

ASEN 5107 Nonlinear Finite Element Methods
Homework 1: Chapter 2 of Notes

Due Thursday January 25, 2007

Do three Exercises: 2.2, 2.3(c)-(f), 2.4.

See below for samples on how to answer for Exercise 2.3 items.

See back of page for homework presentation guidelines.

For Exercise 2.3 one or more nonlinear sources may be important, depending on the problem. For example, here are the answers to 2.3(a,b):

(a) Main source of nonlinearities:

Geometric (change in pipe geometry is important as it bends).

(b) main source of nonlinearities, in decreasing order of importance:

Geometric (change in geometry important)

Material (rubber is elastic but nonlinear)

Force B.C. (pressure is normal to deforming balloon wall)

Displacement B.C. (contact) might occur for some inflation devices; for example if the balloon is inflated inside a container

ASEN 5107 Nonlinear FEM Homework Preparation Guidelines

Guidelines for homework grading:

- Group homework is ENCOURAGED. See rules in course outline handout. Groups return only one HW, with everybody's name on it.
 - HW are due at the beginning of the class on the due date. If you will be absent that day, please make appropriate arrangements. **LATE HOMEWORKS WILL NOT BE GRADED AND ARE NOT ACCEPTED FOR CREDIT.***
 - Lowest HW grade (in percent) will be dropped when computing the overall average.
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Guidelines for homework presentation:

- Write only on *one side* of the paper. Use of engineering paper is recommended.
- Neatness counts.
- Be sure to start each EXERCISE on a NEW page to facilitate grading.
- *Highlight* answers by boxing or underscoring, and mark with arrow on margin.
- Show work: just giving the final answers gets no credit.
- If the problem specifies physical units, be sure to identify them in the answers.
- When making plots of your results use graph paper or engineering paper, or do them through some computer program. Use of computers for analytical work as well as calculations in non-computer HW is encouraged.
- Guidelines for computer homework will be stated in the first assignment of this kind.
- Be sure to write your name on the first page of your returned work (names if done by a group), and your initial(s) on subsequent pages. Staple pages securely. *Use the HW assignment sheet as cover*, and write an identifying name (or names if in a group) on it to facilitate return. If HW is returned by a group, underline the name of who will pick it up.

Homeworks not claimed during class may be picked up from the instructor's office at ECAE 187.

* This policy is a consequence of group HW being allowed. If you feel you may miss HW deadlines because of overwork, join a group and pool your efforts.