ME 551: Computer-Aided Engineering

Name: _____
Instructor : K. Nema

HOMEWORK ASSIGNMENT # 9

Notes:

- Follow the HW instructions carefully in the syllabus.
- Your solutions must be attached to this sheet.
- Worth 50 Points.

1. Conduct a literature survey of advanced applications of the finite element method for engineering design and analysis.
2. Identify at least one application, which interests you the most.
3. Submit a report on your findings, with technical scope and information on the application you have identified (at least three pages).

Notes:

A) Possible applications may include:

   a. Stress analysis of complex structures, nonlinear materials, large deformations, structural stability (buckling), dynamic response, etc., – Computational Solid Mechanics (CSM).

   b. Analysis of heat transfer problems involving solids, fluids convection, radiation, etc., - Computational Heat Transfer (CHT).

   c. Analysis of fluid dynamics problems – Computational Fluid Dynamics (CFD).

   d. Analysis of electromechanical and electromagnetic problems – Computational Electromagnetics (CEM).

   e. Analysis of metal casting, plastics molding, phase change phenomena, etc.

   f. Coupled problems, such as solid-fluid interactions, conjugate heat transfer, thermal stress, etc.

B) Applications may be in automotive, aerospace, materials processing, biomedical (biofluids, bioheat, biomechanics), chemical, pharmaceutical, and computer manufacturing, industries.

C) Good sources for investigation are various finite element and computational mechanics websites including:

   a. www.ansys.com for Ansys

   b. www.engr.iupui.edu/cfdlab for our department's Computational Fluid Dynamics Laboratory

   c. www.engr.iupui.edu/me/courses/fproject.shtml for our department's sample undergraduate projects

   d. www.engr.iupui.edu/me/fpres.shtml for our department's sample graduate projects

   e. any other appropriate Web sites you might discover

D) Your report should contain the following information:

   a. Cover page

   b. Description and significance of the problem

   c. Application areas

   d. Possible finite element modeling approaches

   e. Your potential contributions

   f. Source(s) of information (i.e., references)