MAE 734
Finite Element Analysis
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Course Web Site Moodle for 001 and 601

Prerequisite: MAE 533 or equivalent

Course Description: This course will provide a general preparation in computational solid mechanics for graduate engineering, science, and mathematics students who will pursue further work and research in specialized areas such as elasticity, plasticity, fracture mechanics, structural mechanics, mechanical design, fluid mechanics, and numerical analysis with a focus on nonlinear behavior. Recommended prerequisites: Elasticity and Introductory Finite-Elements. Some of the topics to be covered will include:

I. Review of Linear Finite-Elements: Variational calculus, weak solutions, variational solutions

II. Dynamic and wave propagation problems

III. Nonlinear Problems: Finite-elasticity, plasticity, viscoplasticity, and creep, Solution Methods

IV. Incompressibility, reduced and selective integration, incompatible modes, mixed formulations and constraints

V. Plates and shells

VI. Contact

VII. Research topics in solid and computational mechanics

Grading

Homework/Projects/Paper 65%
Exams 35%

Final Exam Scheduled for May 2, 8:00 AM.
Possible projects will include a final paper that will deal with a presentation of current research topics related to nonlinear behavior/mechanics.

Notes written by myself, relevant papers will be handed out and will form the main core of the lectures.

Recommended Books:
Finite-Element Procedures, Klaus-Jurgen Bathe
Concepts and Applications of Finite Element Analysis, Cook, Malkus and Plesha
Programming Skills: Fortran, Matlab, C++, C, Commercial FE Codes

The approach for this class will involve class participation in an inverted class environment based on a modular approach. Notes will be available beforehand for discussion and group interactions.

Office Hours: MW 11:30-12:30