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Lab: Th. 5:00 pm to 5:50 pm (OHE132)

Main Topics of Lectures:

Variational Models
1. Calculus of variations
2. Constraints – Lagrange’s multiplier
3. Constraints – Penalty
4. Galerkin’s method.

Continuum Finite Elements
1. 1-D interpolation methods
2. 2-D interpolation methods – rectangles and triangles
3. 3-D interpolation methods – hexahedron, tetrahedron, prism

Iso-parametric Elements
1. Mappings – physical system and natural coordinate system
2. Numerical integration – Gauss’ quadrature

Numerical Implementation of the Finite Element Method
1. Column storage schemes
2. Assembly in active column form
3. Static column solvers
4. Mesh generation

Finite Elements for Elasticity Problems
1. Plane stress – plane strain
2. Stress calculation
3. Incompressible problems
4. Pressure, enforced displacement, and thermal loading

Finite Elements for Axi-symmetric Elasticity Problems

Finite Elements for Plate Problems

Finite Elements for Shell Problems

Finite Elements for Dynamic Problems

Introduction to Nonlinear Finite Element Analysis

Adaptive Methods

Text Book:
- Cook, et. al., "Concepts and Applications of Finite Element Analysis", Wiley
- Wellford, L.C., "CE 529a Class Notes", a copy of all course material which I will present.

Grading
25% Homework + 25% Midterm Exam (TBD) + 25% Project (Due Date: Dec 14) + 25% Final Exam (Dec 14, 7-9 pm) = 100%
- Homework: Weekly assigned homework, problems are due on the following week