Computational Mechanics of Solids and Structures

CVEN 7511-001

Fall 2001

Instructor: Kaspar Willam
Office: ECOT 456, Hours TR 11:00 - 12:30 a.m.
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Prerequisites: Mechanics of Materials, Finite Element Analysis

Course Work:

- Lectures: TR 11:00-12:30 pm, ECCR 137
- Assignments (20 %): Homework Problems.
- Midterm Examination (20 %): Take-Home Exam.
- Computer Term Project (20 %), Presentation (10 %): 
- Final Examination (30 %): Saturday, Dec. 15, 7:30 - 10:00 pm

Reference Texts:


Software Platforms:

- MATLAB, MATHEMATICA, Structures Programs
- ABAQUS (HKS), DYNA3D (LSTC)
- FEAP (R.L. Taylor UC-Berkeley)
- MFEM-FETI (CU-Boulder)
Course Outline

1. Preliminaries
   - Notation
   - Continuum Mechanics
   - The Finite Element Displacement Method
   - Linear vs. Nonlinear Finite Element Analysis

2. Total and Updated Lagrange Formulations in 1-D
   - Strong Form of Momentum Balance
   - Weak Form of Momentum Balance
   - 1-D Finite Element Discretization of Motion: TLF and ULF
   - Linearization of Internal Forces
   - Tangential Stiffness: Material and Geometric Properties

2. Total and Updated Lagrange Formulations in 2-D
   - Strong Form of Momentum Balance
   - Weak Form of Momentum Balance
   - 2-D Finite Element Discretization of Motion: TLF and ULF
   - Linearization of Internal Forces
   - Tangential Stiffness: Material and Geometric Properties

3. Nonlinear Material Formulations
   - Nonlinear Elasticity and Damage
   - Flow Theory of Plasticity
   - Computational Plasticity