ADVANCED MECHANICS OF MATERIALS I

CVEN 5161-001

Fall 2003

Instructor: Kaspar Willam
Office: ECOT 456, hrs: MWF 10:00 - 11:00 a.m.
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Prerequisites: Interest in Mechanics and Materials

Course Organization:

- Lectures: TR 11:00-12:15 p.m., ECCR 137
- Assignments: Reading and Homework (20%).
- Midterm #1: In-Class Examination (20%).
- Midterm #2: Take-Home Examination (30%).
- Project Report: Term-Project (20%).
- Final Presentation: Tuesday, December 16, 2002, 7:30 - 10:00 am (10%).
- Homepage: http://bechtel.colorado.edu/~willam/CVEN5161.html

References:

  http://bechtel.colorado.edu/~willam/matl01.pdf

Software:

- MATLAB, MATHEMATICA, ABAQUS, FEAP
Course Outline

1. Preliminaries
   - Principles of Mechanics of Materials
   - Elements of Stress and Strain
   - Linear Elastic Materials
   - Failure Criteria of Materials

2. Linear Elasticity
   - Equilibrium of Elastic Bodies
   - Kinematics of Deformable Bodies
   - Boundary Value Problem of Linear Elasticity
   - Exact and Approximate Solution Methods
   - Airy Stress Functions in 2-dim Elasticity

3. Torsion of Elastic Bars
   - Torsion of Cylindrical Bars
   - St Venant Theory of Elastic Torsion
   - Prandtl Soap Film Analogy
   - Torsion of Thin-Walled Sections

4. Bending of Elastic Beams
   - Euler-Bernoulli Beam Theory
   - Timoshenko Beam Theory
   - Linear Elasticity Solution of Bending
   - Bending of Symmetric Sections
   - Bending of Nonsymmetric Sections

5. Stability of Columns
   - Concepts of Stability
   - Elastic Buckling: Euler Formula
   - Column under Eccentric Loading
   - Beam-Column Analysis
   - Inelastic Buckling: Engesser vs Shanley

6. Thermal Stress Analysis
   - Thermoelectricity
   - Eigenstrains
   - Heat Transfer
   - Kelvin Effect