1.050 Engineering Mechanics

Lecture 13:
Strength models
Strength models for beams (I/II)

1.050 – Content overview

I. Dimensional analysis

1. On monsters, mice and mushrooms
2. Similarity relations: Important engineering tools

Lectures 1-3
Sept.

II. Stresses and strength

2. Stresses and equilibrium
3. Strength models (how to design structures, foundations.. against mechanical failure)

Lectures 4-15
Sept./Oct.

III. Deformation and strain

4. How strain gages work?
5. How to measure deformation in a 3D structure/material?

Lectures 16-19
Oct.

IV. Elasticity

5. Elasticity model – link stresses and deformation
6. Variational methods in elasticity

Lectures 20-31
Nov.

V. How things fail – and how to avoid it

7. Elastic instabilities
8. Plasticity (permanent deformation)
9. Fracture mechanics

Lectures 32-37
Dec.

1.050 – Content overview

I. Dimensional analysis

II. Stresses and strength

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Lecture 8: Beam stress model
Lecture 9: Beam model II and summary
Lecture 10: Strength models: Introduction (1D)
Lecture 11: Mohr circle – strength criteria 3D
Lecture 12: Application – soil mechanics: How to build sandcastles
Lecture 13: Strength criterion in beams (I/II)
Lecture 14: Strength criterion in beams (II/II) – convexity of strength domain
Lecture 15: Closure strength models & review for quiz
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III. Deformation and strain

IV. Elasticity

V. How things fail – and how to avoid it

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http://www.civeng.unsw.edu.au/research/images/semi-continuous.jpg
http://members.tripod.com/str_n_tips/eq/eq_rcc2/g23.jpg

Photograph of beam failure removed due to copyright restrictions.

http://www.emeraldinsight.com/fig/1100210504010.png