

1.050 Engineering Mechanics I

Lecture 31

Energy bounds in beam elasticity

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

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

Lectures 4-15
Sept./Oct.

III. Deformation and strain

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

Lectures 16-19
Oct.

IV. Elasticity

7. Elasticity model – link stresses and deformation
8. Variational methods in elasticity

Lectures 20-31
Oct./Nov.

V. How things fail – and how to avoid it

9. Elastic instabilities
10. Plasticity (permanent deformation)
11. Fracture mechanics

Lectures 32-37
Dec.

1.050 – Content overview

I. Dimensional analysis

II. Stresses and strength

III. Deformation and strain

IV. Elasticity

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Lecture 27: Introduction: Energy bounds in linear elasticity (1D system)

Lecture 28: Introduction: Energy bounds in linear elasticity (1D system), cont'd

Lecture 29: 1D examples

Lecture 30: Generalization to 3D

Lecture 31: Energy bounds in beam elasticity

Lecture 32: Energy bounds in beam elasticity: How to solve problems

V. How things fail – and how to avoid it

Lectures 33 to 37