Lecture 10:
Strength models
1D examples – truss structures
1.050 – Content overview

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

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

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

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

V. How things fail – and how to avoid it
   7. Elastic instabilities
   8. Plasticity (permanent deformation)
   9. Fracture mechanics

Lectures 1-3
Sept.

Lectures 4-15
Sept./Oct.

Lectures 16-19
Oct.

Lectures 20-31
Nov.

Lectures 32-37
Dec.
I. Dimensional analysis

II. Stresses and strength

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 – foundations

III. Deformation and strain

IV. Elasticity

V. How things fail – and how to avoid it
Quiz I

Covers first 15 lectures

QUIZ I:
Dimensional analysis, stresses and strength

Monday October 15 in class

Start to prepare early!
Surface roughness

Image of crack propagation removed due to copyright restrictions.
$A_1/A_3=2$  same strength $\sigma_0$