Engineering Dynamics Formalities

ME 46055

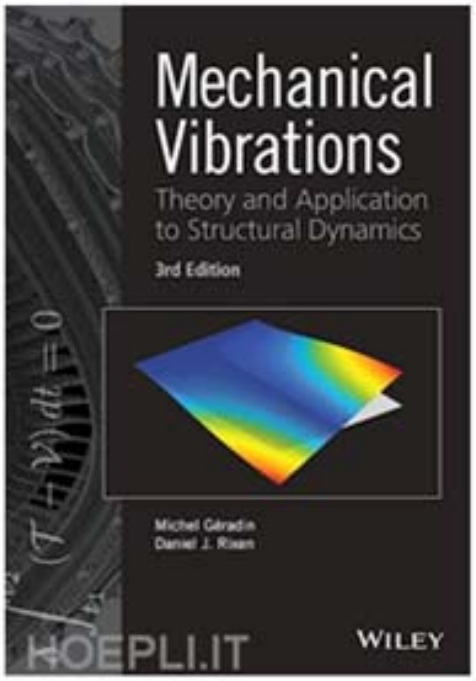
Farbod Alijani

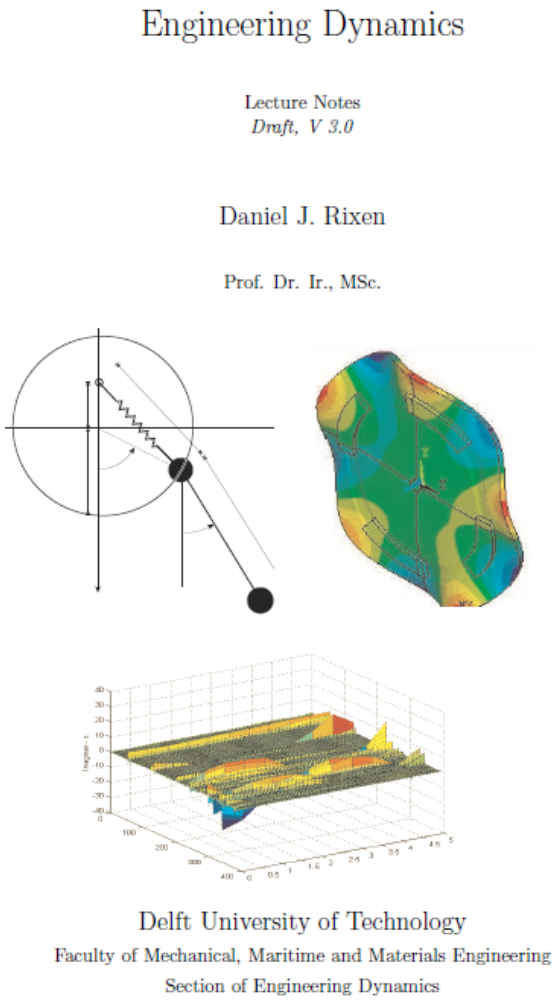
- Lectures are Tuesdays 13:45-15:45 & Fridays 8:45-10:45
- Tuesday lectures will be given at LR-CZ D, and Friday lectures at 3mE-CZ E (Robert Hooke)
- We will have 13 sesions+1 session open question
- Exam is on November 8 (Tuesday) from 18:30-21:30.
- Office hours: every Thursday from 4-5 pm, except Oct 13.

- Lectures are NOT recorded at Collegerama. However, lectures of last year are already recorded and available.
- You are all encouraged to come anyway.
- You can directly ask questions.
- You will listen to the lectures in real pace.

Lecture notes

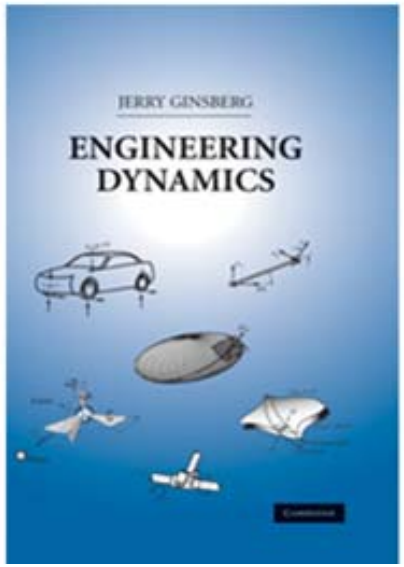
- The notes and the reader are already available on the balckboard. This contains almost everything that I will discuss
- The slides, additional problems, samples of previous exams are already posted on blackboard
- The note you find on the blackboard is the shortened version of the following book:

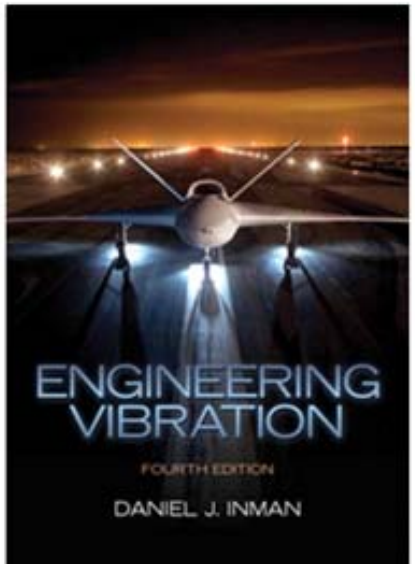


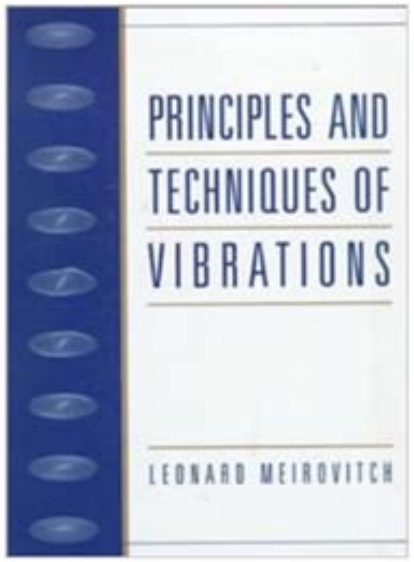


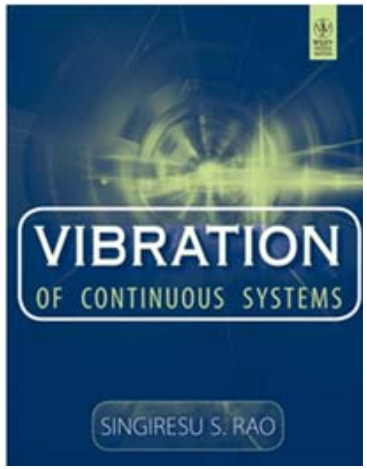
References

- For those of you who are interested in additional material









Exam

- Written exam (75%)
- Assignment (25%)

- Weighs may slightly vary.
- Your final mark will be an almost weighted average of the above two.

Written Exam

- You will be asked to answer two/three questions.
- One big problem in which you will be asked to apply/calculate whatever is taught in the class
- A conceptual question: No derivation of equations or formulas

Assignment

- To apply the course topics to a realistic problem.
- It will be given in parts as soon as the relative materials are covered in the class.
- A Matlablike software is required to carry out the assignment
- To be documented in the form of a report (Refer to “how to write a good report” on blackboard)
- The report is intended for you to outline your understanding of the problem. Imagine it is intended for a client. that is an engineer but not a specialist in dynamics. The client has 20 minutes to read the report and to be convinced that you understand what you did.
- The deadline for the report is Monday November 14.
- You are encouraged to do the assignment in team of 2.

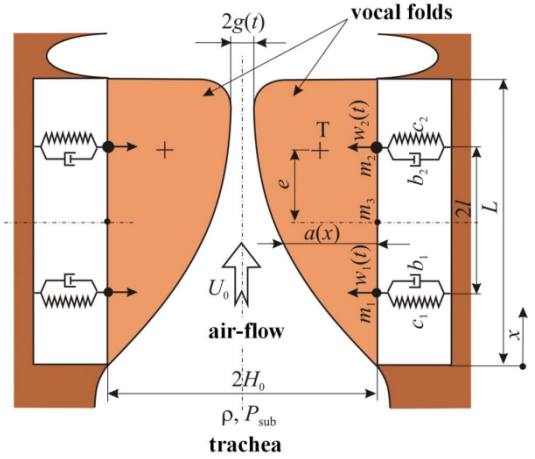
Dynamics overview

Aerospace

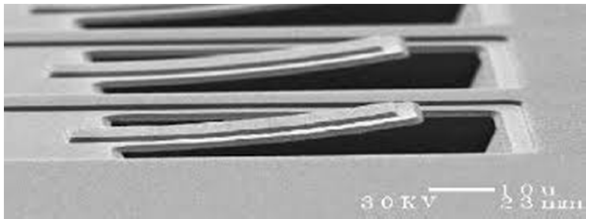
Automotive

civil

Biomechanics



Microsystems



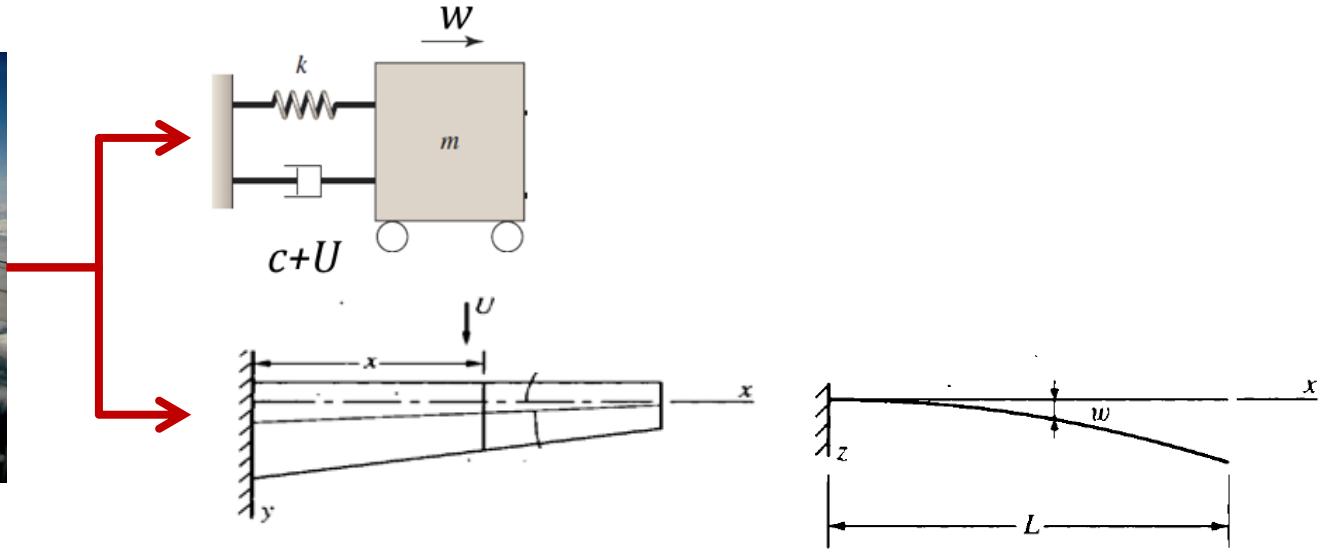
Music

Dynamics overview

As engineers we need to well-observe phenomena in order to analyze them

Step 1

1. How to model a dynamic phenomena?



1. Equations of motion 2. Vibrations 3. Stability

ME46055 – Engineering Dynamics

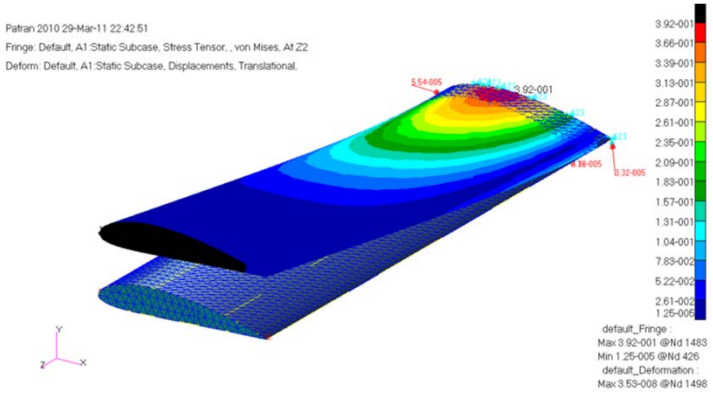
Dr. Farbod Alijani

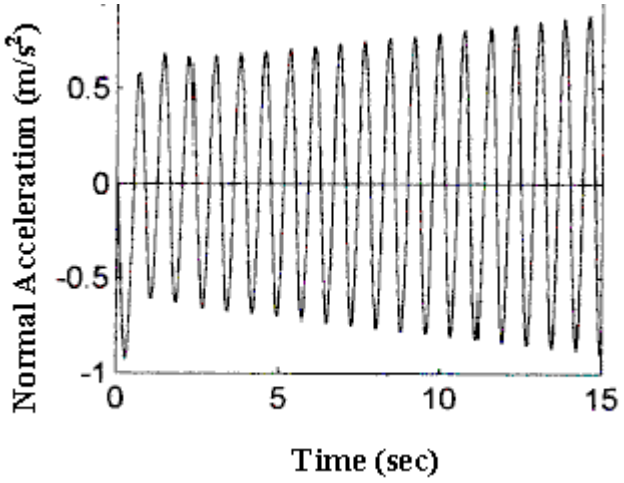
Credits: 4 ECTS

Quarter: 1

Step 2

2. How to numerically solve the developed model?





Finding solutions for mathematical models!

1. Discretization
2. Time integration
3. Eigensolvers
4.FEM ...

ME46050 – Advanced Finite Element Method

Dr. Alejandro Aragon

Credits: 4 ECTS

Quarter: 3-4

Step 3

How to experimentally validate the model?

Practicing theory in real application

ME46040 – Experimental Dynamics

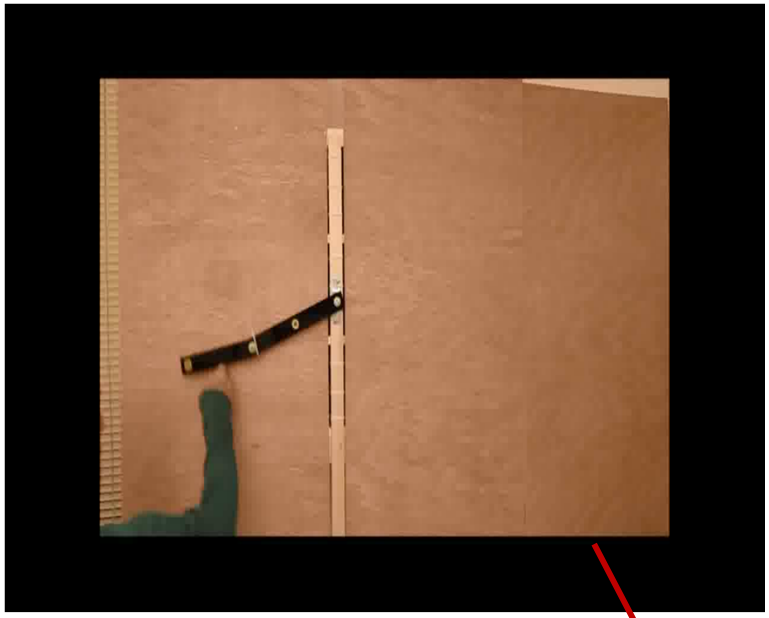
Dr. Dennis de Klerk

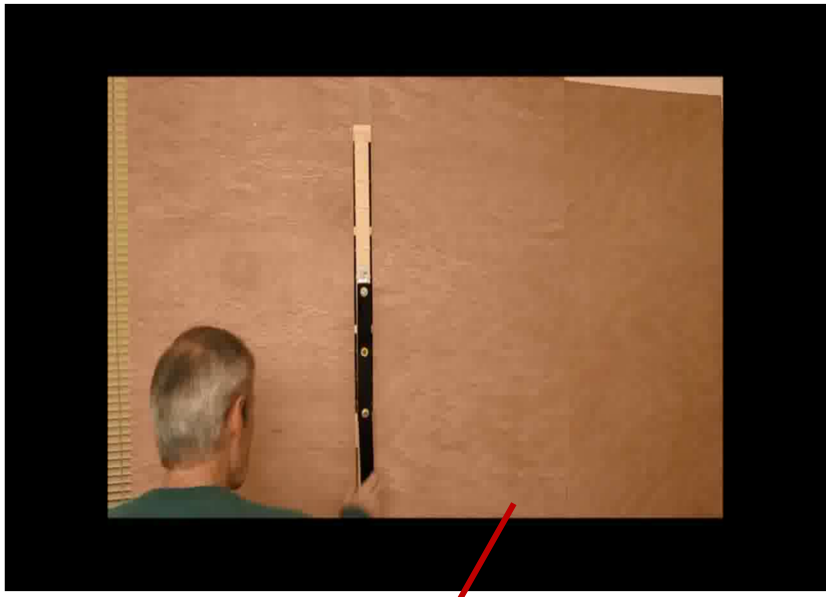
Credits: 3 ECTS

Quarter: 3-4

Step 4

How complex systems could be in reality?





Periodic (Linear)

Chaotic (Non-linear)

ME46000 – Non-linear Mechanics

Prof. van Keulen, Dr. Ayas, Dr. Alijani

Credits: 4 ECTS

Quarter: 2

Dynamics overview

What you will learn in this course is the first step

- Different ways to obtain dynamic equilibrium; I assume you all know Newton's 2nd law of motion and rigid body dynamics .
- How we can linearize dynamic equations? You will learn that this can be done around points we call equilibrium points.
- You will learn about stability.
- Small oscillations around stable equilibrium.
- If time permits a brief introduction to continuous systems.