LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Mekaniska vibrationer
Mechanical Vibrations

FMEN11, 7,5 credits, A (Second Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED M
Date of Decision: 2023-04-11

General Information

Elective for: BME4, F4, F4-bem, I4, M4-bem, Pi4-bem
Language of instruction: The course will be given in English

Aim

The aim of the course is that the student aquire:

- knowledge of the theory of small oscillations of undamped and damped mechanical systems with multiple degrees of freedom for discrete systems, as well as continuous systems
- insight in the theory of wave propagation in elastic materials
- understanding of different fysical phenomena such as resonance and anti resonanse
- experience of applications in the field of mechanical vibrations

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- give an account of the most important results in the theory of small oscillations in undamped and damped mechanical systems.
- formulate and analyse theoretical models for small oscillations in n-degree systems as well as in some simple continuous systems.
- apply modal and transient analysis.

Competences and skills
For a passing grade the student must

- analyse mechanical systems with the aid of computer programmes (for example using Mathcad).
- work with analythical equations and using them identify relevant fysical properties
- perform analyses of vibration problems and present the results in well-written reports.

Judgement and approach
For a passing grade the student must

- be able to evaluate technical solutions, for instance vibration isolation and damping of vibrations.
- be able to evaluate achieved results based on the problem formulation at hand as well as physical limitations.
- participate at discussions about technical problems and possibilities of mechanical vibrations in industrial applications.

Contents

Vibrations in n-degree of freedom systems. Free vibrations and forced vibrations. Damping mechanisms. Gyroscopic forces. Modal analysis (classical normal modes, complex modes). Transfer functions. Transient response. Continuous systems and wave propagation. Vibration damping and vibration isolation. Examples of numerical analysis of mechanical vibrations. Industrial applications.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Hand in exercises and written exam.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Admission

Assumed prior knowledge: Basic courses in Mechanics, Linear Algebra and Calculus in One Variable and Several Variables.
The number of participants is limited to: No
The course overlaps following course/s: FMEF05, FMEN10

Reading list

- M. Géradin & D. Rixen: Mechanical Vibrations. John Wiley & Sons.
- Lidström, P: Lecture notes on Mechanical Vibrations.
- Lidström P. Mechanical vibrations Exercises.

Contact and other information

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