CHALMERS

2012-01-12

Syllabus

Fundamentals of Sound, Structures and their Interaction

Responsible teacher: Wolfgang Kropp (wolfgang.kropp@chalmers.se, 031 7722204)

Further teachers in the course: Patrik Andersson, Astrid Pieringer

Aim

The course intends to give basic knowledge an in-depth understanding of structure- borne sound and its control. The course focuses on the prediction and control of sound propagation in structures and the radiation of sound from structures.

Intended Learning Outcomes

Students should after finalising the course be able to:

- Describe and apply the fundamental concepts used in the field of structural acoustics (wave approach, modal approach, description of damping, etc.)
- Apply the equations that describes fundamental acoustics as well as wave motion in fluids and solids in order to describe propagation and reflection/transmission of waves at interfaces between different materials and geometries (e.g. blocking masses, elastic interlayers, junctions)
- Apply and evaluate experimental tools such as mobility measurements
- Understand and design secondary noise control measures such as sound and vibration isolation
- Discuss different damping models applied in structural acoustics and design damping treatments such as simple damping layers and sandwich design for noise control problems
- Explain the coupling between waves in fluids and solids, along with being able to apply this theory to predict sound radiation from structures in a qualitative and quantitative way

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Course Structure

The course consists of 10 lectures supported by 2 exercises. Each lecture and exercise consists of two hours (45 minutes+ 15 min break).

Schedule

The tentative schedule of the lectures is as follows:

27/2 08:00-10:00	Lecture 1	Introduction to the fundamentals of Acoustics
27/2 10:00-12:00	Lecture 2	Introduction, lumped systems, concept of modes, eigenfrequencies, forced and free vibrations, damping concepts
5/3 08:00-10:00	Lecture 3	Waves in structures, longitudinal, torsional and flexural waves in beams and plates
5/3 10:00-12:00	Lecture 4	Concept of mobilities
12/3 08:00-10:00	Lecture 5	Isolation of structure borne sound, blocking mass and elastic interlayer
12/3 10:00-12:00	Lecture 6	Vibration isolation, Damping layers
19/3 08:00-10:00	*Exercise 1*	*Waves in structures , Vibration isolation*
19/3 10:00-112:00	Lecture 7	Sound radiation from simple radiators
26/3 10:00-12:00	Lecture 8	Sound insulation
26/3 10:00-12:00	Lecture 9	Sound in cavities, absorption
2/4 8:00-10:00	Lecture 10	Modes in cavities, diffuse sound field
2/4 10:00-12:00	*Exercise 2*	*Sound field in the car compartment*
16/4 10:00-12:00	Reserve time	Summary and repetition

Course material

The course material consists of lecture notes produced by the Division of Applied Acoustics. The notes will successively be available from 25/2 at
http://www.ta.chalmers.se/education.php?page=cpg_gsp

username: student
password: ett2tre
The page will also be our communication platform. Please check the page regularly before lecture events.

Examen

The exam will be based to equal parts on an assignment (carried out in groups of two participants) and an oral exam.