FSD3110 Structure Borne Sound 7.5 credits

Structure Borne Sound

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for FSD3110 valid from Spring 2019

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Masters degree in mechanical engineering, vehicle engineering, engineering physics or equivalent. Documented knowledge of English corresponding to English B / English 6.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

Students graduating from the course should:

- Have knowledge about the concepts and methods used to describe and analyse vibrations in both discrete and continuous systems
- Be able to derive the homogeneous wave equations and their solution for the different types of waves in structures
- Understand the concepts of mobility, impedance, energy and power and be able to derive their corresponding expressions all structural wave types
- Be able to describe the transmission of reflection of structural waves in complex junctions and derive expressions for reflection and transmission coefficients
- Understand the different discrete damping models, the concept of loss factor and the implications of damping for the vibration response of beams and plates
- Be able to derive expressions for the loss factors of plates with attached layers

Course contents

Structure borne sound refers to noise that is originated by vibration sources and the transmission of these vibrations to an element that can radiate sound. According to the source-transmission-radiator-receiver model, and since minimizing the source of vibration is often not feasible, the most effective way to minimize structure borne sound is to minimize the transmission of vibrations. This course is about how vibrations are transmitted in structures and how the transmission can be minimized. To this end we learn about structural wave types such as longitudinal and bending wave and how to determine the energy input to these waves for several forcing conditions. Furthermore we learn about how wave are transmitted and reflected and how to model damping in beam and plate structures.

Disposition

The course is organized in four full-day seminars. Each seminar concentrates on one topic. Students get the seminar questions beforehand and prepare before the seminar.

Each seminar is organized as follows:

- Short meeting to discuss the questions for the day and clarify any doubts

- Students are split in groups of three and work on the question for about four hours

- Finally a plenary discussion of two to three hours takes place where the groups present their answers for the questions

Course literature

Structure Borne Sound, 3rd edition, Cremer, Heckl and Petersson

Equipment

Computer.

Examination

- SEM1 - Seminar, 2.5 credits, grading scale: P, F
- TEN1 - Exam, 5.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Oral exam takes place in groups.

Other requirements for final grade

Participation in course seminars, assignments and oral exam.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.