SD2110 Introduction to Noise Control 3.0 credits

Introduktion till bullerbekämpning

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

The course syllabus is valid from Spring 2022 according to the school principal's decision: S-2022-0529 Decision date: 2022-02-24

Grading scale

P, F

Education cycle

Second cycle

Main field of study

Specific prerequisites

Basic courses in mechanics and mathematics.

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

After the course, the participant shall be able to:

- Know basic acoustic definitions:
  - Define peak value of sound pressure.
  - Define mean value of sound pressure.
  - Define root mean square value of sound pressure.
- Comprehend basic wave types in fluids:
  - Explain the characteristics of plane waves.
  - Give an example of plane waves from the ‘real world’.
  - Explain the characteristics of cylindrical waves.
  - Give an example of cylindrical waves from the ‘real world’.
  - Explain the characteristics of spherical waves.
  - Give an example of spherical waves from the ‘real world’.
- Comprehend basic wave types in infinite solids:
  - Explain the characteristics of longitudinal waves.
  - Give an example of longitudinal waves from the ‘real world’.
  - Explain the characteristics of transversal waves.
  - Give an example of transversal waves from the ‘real world’.
- Comprehend Huygen’s Principle:
  - State the principle in his or her own words.
  - Identify an example of the principle.
- Comprehend D’Alembert Principle:
  - State the principle in his or her own words.
  - Identify an example of the principle.
  - Predicts an outcome based on the principle for harmonic waves.
- Apply acoustical methods to new situations:
  - Predict the total A-weighted sound power level for the whole audible frequency range from known third-octave band levels
  - Calculate the harmonic components of an arbitrary periodic signal
  - Computes the resulting sound level of a broad band sound when passed through a frequency filter
- Synthesize complex waves from simple waves:
  - Combines longitudinal and transversal waves to form bending waves
  - Creates standing waves from travelling waves using reflections
  - Combines longitudinal and transversal waves to form quasi-longitudinal waves
- Comprehend the wave equation:
  - Derive the wave equation in fluids
  - Determine the solution of wave equation in fluids:

Course contents

Definition of sound – sound pressure and velocity. Upper, mean, mean square and root mean square values. Frequency, period, wave length, wave number, phase velocity. Plane, cylindrical and spherical waves.

Diffraction of waves – Huygen's Principle. Reflection of waves. D'Alembert Principle. Harmonic and periodic signals. Fourier series analysis. Frequency spectrum – audible frequency range, octave band, one-third octave band, upper and lower frequency limit, band-width, centre frequency. Frequency filter – low-pass, high-bass, band-pass and band-stop filters. Measures of sound – sound pressure, sound intensity and sound power levels. Addition of sound fields – correlated and uncorrelated sources. Addition of frequency components. Weighted frequency spectrum – A, B, C and D-filters.

Standing and travelling waves. Longitudinal and transversal waves in infinite solids. Wave equation and its solutions in fluids.

Examination

- TEN1 - Examination, 3.0 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.

Other requirements for final grade

Oral examination (TEN1; 3 university credits).

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.