SD2110 Introduktion till buller-bekämpning 3,0 hp

Introduction to Noise Control

Fastställande

Betygsskala

P, F

Utbildningsnivå

Avancerad nivå

Huvudområden

Särskild behörighet

Basic courses in mechanics and mathematics.

Engelska B/ Engelska 6

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

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:

Kursinnehåll

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 - Tentamen, 3,0 hp, betygsskala: P, F

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enstaka studenter.

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

Övriga krav för slutbetyg

Oral examination (TEN1; 3 university credits).

Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.
- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.
- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.