FSD3137 Numerical Methods for Sound Propagation II 4.0 credits

Numeriska metoder för ljudutbredning II

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 FSD3137 valid from Autumn 2018

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

MSc within vehicle engineering, physics or an education corresponding to those are required for eligibility.

Language of instruction

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

Intended learning outcomes

The learning outcomes of the course are that the students should be able to:

- Obtain expanded knowledge of sound propagation in the atmosphere and /or for underwater applications. The course is intended to be a continuation of SD3136 “Numerical methods for sound propagation I” and individual preferences of the course alignment may be considered. For instance, the objectives could be to model parameters that determine sound speed profiles in the respective media, turbulence modeling and methods for calculating sound propagation in terrain following coordinate systems or geometries with multiple reflections.
- Encode sound propagation algorithms with realistic sound speed profiles, such as Ray tracing, Normal mode, Wavenumber integration, Boundary elements or Parabolic equation methods.
- Model boundary conditions at non-planar or non-smooth boundaries by for example Boss theory, terrain following coordinates and/or multiple boundary layer techniques.
- Provide detailed descriptions of assumptions related to numerical methods and their strengths and weaknesses, such as comparing the angular dependence different of parabolic equation solvers, investigate how Gaussian beam synthesis can be used to model diffraction into shadow zones and/or propagation in an urban environment.

Course contents

The course covers different numerical methods of computing far field propagation in moving homogenous media (air and/or water). Students can in consultation with the teacher select an individual topic according to interest and what is appropriate to the students thesis work. Seminars will be organized to discuss the literature and hand-in assignments giving students insight into each other's work, thereby increasing the width of the knowledge. The examination of students will be carried out by evaluating the hand-in assignments and their active participation in the seminars.

Disposition

Seminars discussing the literature as well as hand-in exercises will be held. The examination of students will be performed by an oral exam and by evaluating hand-in exercises and active participation in the seminars.

Course literature

The recommended literature:

Selected parts of:

E. Salomons, Computational atmospheric acoustics, Kleuwer, 2003

F. B. Jensen et al, Computational ocean acoustics, Springer, 2011

S. Kirkup, The boundary element method in acoustics, Integrated Sound Software (E-bok), 2007

- Selected articles

Equipment

Computer

Examination

- PRO1 - Project work, 3.0 credits, grading scale: G
- TEN1 - Exam, 1.0 credits, grading scale: G

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.

The examination of students will be performed by an oral exam and by evaluating hand-in exercises and active participation in the seminars.

Other requirements for final grade

Active participation in the seminars. Passed on oral exam and passed hand-in exercises.

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.