Course PM, version 0.9

Lectures:

References are to chapters in Jonsson + Ström.

18/1 Green's functions and introduction to integral equations Cherenkov radiation **cherenkov.pdf (https://canvas.kth.se/courses/21385/files/3756656/download?wrap=1)**  **(https://canvas.kth.se/courses/21385/files/3756656/download?wrap=1)**. §1
21/1 Integral representation, bounded domain and exterior domain, Solving integral equations §2-§2.3,

25/1 Integral representation exterior domain continued §2.4- ,§2.5
28/1 Equivalent currents, §3,

1/2 Representation of far-fields, Reflector antenna Chapter 4, geometric optics, physical optics. Discussion of HWP1,
4/2 Geometric Optics example (end of Chapter 4) **geometrisk.pdf (https://canvas.kth.se/courses/21385/files/3680351/download?wrap=1)**  **(https://canvas.kth.se/courses/21385/files/3680351/download?wrap=1)**. Start of Spherical Harmonics and Multipoles. Expansion as vector multipole fields: Appendix A,

8/2 Multipoles, §5**,**
11/2 §5.5 + Scattering of a sphere §6

15/2 End of §6, Scattering of spheres +HWP2-discussion.
17/2 Radar cross-section. §7,
19/2 Short about multiple scattering **multiple.pdf (https://canvas.kth.se/courses/21385/files/3680352/download?wrap=1)**  **(https://canvas.kth.se/courses/21385/files/3680352/download?wrap=1)**. Acoustic null-field method §8.1-8.4

22/2 Acoustic null-field method §8.4- The null-field method: Electromagnetic case
25/2 The null-field method: Electromagnetic case §9,

1/3 Scattering by integral methods, §10, HWP3 discussion,
4/3 Scattering from a dipole §11.1-11.2 Time domain Green's function

17/3 Verbal exam

Note! If less than 5 students actively participate in the course it will become a reading course without pre-recorded lectures.

The above schedule is a guideline and can be updated depending on how the classes work out.

Homework problems

There are three (large) homework problems (HWP). Each assignment is typically a smaller design task or a deeper exploration of some result. There exists several predefined HWPs, but if a student wants to do a subject related or article related problem in the area, discuss it with Lars during the week of the hand out of the problem.

- HWP 1 hand out 28/1. Due Monday 8/2.
- HWP 2 hand out 8/2. Due Monday 22/2.
- HWP 3 hand out 22/2. Due 8/3.

The deadlines are sharp, and HWPs delivered before the deadline will each be graded with 0-100 points. Reports delivered late will not be graded. The report is to be written using a word processor, e.g. Latex or Word or similar, and organize as follows:

- Describe your analysis/solution. Refer to the course literature or HWP information when appropriate
- Give a brief description of the numerical treatment. Comment on the figures and tables that have been inserted into the text
- Attach your numerical code.

The reports shall be uploaded according to the deadlines above. The grading of the assignments will be based on the degree of activity, creativity, and understanding as they appear from the report. The work is an individual work. You can be requested to present your result.

Exercises

To each chapter, there are a set of exercises giving 1-2 points depending on their size, all in all there are 50+ possible exercises. The exercises of the week *are due to be uploaded before the first lecture of next week*. I.e. the Exercises of week 1 are due **before** the scheduled class on the 25/1 and similarly each week. The information about which exercises are included is updated weekly information no later than after the last class of this week.

Exam

To pass the course one needs a minimum of 300 credits, from HWPs and Exercises giving an E. Credits of 350 or more correspond to a D. For higher grades there an exam, depending on the number of students the exam can either be verbal or written. This year it will with high probability be a verbal exam if the covid-conditions have not improved.

For a written exam, all students bring their HWP-points as the starting point on the exam. We use the conversion between HWP-points, y, to exam-grade points, B, as

$$B = \min\left(\frac{y-300}{10} + 25; 34\right)$$

The exam contains 50 points and we have that conversion between grade-points B and grades such that

24=Fx, 25=E, 30=D, 35=C, 40=B, 45=A.

Thus 350 HWP points correspond to 30 Grade-points and a D on the exam. Higher grades are obtained by writing the exam.

Course responsible, and examiner, Lars Jonsson, 08-790 7732, email: **ljonsson@kth.se (mailto:ljonsson@kth.se)**

The book is for sale in the student bookshop/kårbokhandeln.

Course information: Current information (chapters, exercises, etc per week) about the course will appear on KTH Canvas during the semester. The above schedule is a guideline and can be updated depending on how the classes work out.