Infotech Oulu and Finnish Centre of Excellence in Inverse Problems Research
Invited Lectures, June 16–18, 2010, Oulu, Finland

Inverse Scattering Theory in the Frequency Domain

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Outline

1. The Helmholtz Equation (Bessel functions, Sommerfeld radiation condition, Rellich's lemma).
2. Scattering by an Inhomogeneous Medium (Lippmann-Schwinger equation, unique continuation principle, existence and uniqueness of direct problem).
3. Far Field Patterns (Reciprocity principle, far field operator, interior transmission problem, transmission eigenvalues).
4. Inverse Scattering Problems (Uniqueness of solution to inverse problem, Born approximation, ill-posed problems).
5. The Linear Sampling Method (Tikhonov regularization, linear sampling method, factorization method).
6. Faber-Krahn Type Inequalities (Detection of transmission eigenvalues from the far field pattern and their use in determining lower bounds on the refractive index).

Timetable

The lectures take place in room M101 at the Department of Mathematical Sciences, University of Oulu. The detailed timetable is as follows:

	Wednesday, Jun 16	Thursday, Jun 17	Friday, Jun 18
11–12	Lecture 1	Lecture 3	Lecture 5
12–13	*Lunch*	*Lunch*	*Lunch*
13–14	Lecture 2	Lecture 4	Lecture 6

Student Credits

Both undergraduate and postgraduate students are welcome to attend lectures. Students can earn 2 ECTS credits if they attend all lectures and complete a few assignments and/or exercises.

References

[1] D. Colton and R. Kress. *Inverse Acoustic and Electromagnetic Scattering Theory*, second edition, Springer-Verlag, Berlin, 1998.

[2] F. Cakoni and D. Colton. *Qualitative Methods in Inverse Scattering Theory*, Springer-Verlag, Berlin, 2006.