

Math Minicourses on June 27, 2012 (Aalto University)

On June 27, 2012, there will be **two minicourses** at the conference *Fourier Analysis and Pseudo-Differential Operators* which is held at Aalto University on June 25–29, 2012. The courses are for both (advanced undergraduate) students and experienced researchers, as well. The abstracts of the courses are below, and precise up-to-date information can be found at the conference website

math.aalto.fi/conferences/ECMsatellite2012/

The minicourses are sponsored by the **Finnish National Graduate School in Mathematics and its Applications**.

The participants of the minicourses are naturally welcome to see the other talks at the conference. For students, the registration fee is zero. ;)

M. S. Agranovich: Strongly elliptic second-order systems in a bounded Lipschitz domain

Contents: Lipschitz domains and surfaces. Elliptic system in a divergent form and Green's formula. The spaces H^s of Bessel potentials in Lipschitz domains and on Lipschitz surfaces. Coerciveness and strong coerciveness of the system. The Dirichlet and Neumann problems in the variational setting. Weyl's decomposition of the space $H^1(\Omega)$ in a Lipschitz domain Ω and the choice of the conormal derivative. Poincaré–Steklov problems and operators. The potential type operators on a Lipschitz surface and the hypersingular operator. Calderón's projectors and relations between operators on the boundary. Costabel–McLean representation formula for solutions. The alternative theory ("Calderón's program"). The spaces H_p^s and B_p^s and the generalizations of variational problems. Regularity theorems for solutions, the use of the interpolation theory. Various spectral problems. The Robin problem. Mixed problems. Problems with boundary or transmission conditions on a non-closed Lipschitz boundary.

G. Vainikko: Fast/quasifast solvers of periodic pseudodifferential equations, and some applications to periodic and nonperiodic integral equations

Roughly speaking, a solver of a class of problems characterised by the smoothness of the data (free term, coefficients etc.) is called fast if it is of order optimal accuracy on the class and it uses order minimal amount of arithmetic work compared with other solvers of the optimal accuracy. In the course, quite practicable fast/quasifast solvers of periodic pseudodifferential equations are constructed using, in particular, asymptotic approximations of the pseudodifferential operators, trigonometric approximation of the functions, and two grid solution of discretized algebraic systems. All concepts will be explained in details.

The results are extended to (nonperiodic) integral equations through the periodization of the problem. Probably these solvers are not so practicable but they allow to answer the question: What is the complexity of weakly singular integral equations?

Practical information

Lectures: on Wednesday June 27, 2012
at 14:10–15:40 (M. S. Agranovich) and
at 16:00–17:30 (G. Vainikko)
in Lecture Hall Ko215
at Otakaari 4, Otaniemi Campus.

From each course a credit point can be earned by active participation (i.e. submitting an essay of at most two pages, related to the course).

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