LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

MATHEMATISCHES INSTITUT
PROF. THOMAS ØSTERGAARD SØRENSEN, PHD

SEMINARANKÜNDIGUNG

SoSe11

Mathematisches Seminar: *Pseudodifferential Operators*

Time, room: To be determined

First meeting: *Thu 05/05/11, 10:00 in B 448*
(Discussion of topics and assignment of talks)

If you are interested in participating please contact me by email before the first meeting (sorensen@mathematik.uni-muenchen.de)

Synopsis: The theory of pseudodifferential operators arose in the 1960's as a tool in the study of elliptic partial differential equations (the Laplace equation, Poisson equation, Dirichlet and Neumann boundary value problems etc.). Such operators are a generalisation of Partial Differential Operators (PDO's), and they have since then become a strong and useful tool in many other areas of analysis, such as Harmonic Analysis, Spectral Theory, and Index Theory for elliptic operators on manifolds (they are an important ingredient in many proofs of the Atiyah–Singer Index Theorem).

This seminar will give an elementary introduction to the theory of pseudodifferential operators and their properties. It will include an introduction to the Fourier transform, (tempered) distributions, and Sobolev spaces, which are by themselves very useful tools.

Topics to be discussed:

- Schwartz functions (S) and tempered distributions (S')
- The Fourier transform on S and S'
- Sobolev spaces
- Pseudodifferential symbols
- Oscillatory integrals
- Pseudodifferential operators (ΨDO's)
- The action of ΨDO's on S, S', and Sobolev spaces
- Global regularity of elliptic PDO's (and ΨDO's)
- Gårding's inequality
- Applications

Audience: 3rd year Bachelor students and Master students of Mathematics and Physics, TMP-Master.

Prerequisites: Analysis I-III. Basic knowledge of Functional Analysis and/or Partial Differential Equations is helpful, but not required.

Language: The speakers can choose between English and German.

Literature: X. Saint Raymond, *Elementary introduction to the theory of pseudodifferential operators,* CRC Press, Boca Raton, 1991.

Prof. Thomas Østergaard Sørensen, Ph.D.