Einladung zum

Würzburger Mathematischen Kolloquium

Julius-Maximilians-Universität Würzburg • Fakultät für Mathematik und Informatik

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Universität Göttingen

Variational regularization of inverse problems

Mittwoch, 12. Juli 2017 • 16:15 Uhr

Raum SE 40, Mathematik Ost, Emil-Fischer-Str. 40, Campus Hubland-Nord

Inhaltsangabe:

Inverse problems typically consist in finding causes for observed or desired effects. Examples include biomedical imaging, inverse scattering, electrical impedance tomography, and geophysical exploration. The main difficulty in solving inverse problems is their ill-posedness:

Usually causes do not depend continuously on their effects (if uniquely determined). Consequently, noise in the measured effects may be amplified by an arbitrarily large factor, yielding naive reconstructions useless. A remedy against ill-posedness is regularization, i.e. approximating the discontinuous operator mapping effects to causes (if it exists) by a pointwise convergent regularizing family of continuous operators. The main question in regularization theory concerns the convergence and convergence rate of reconstructed causes (given by a data driven choice of an operator of the regularizing family applied to the data) as the noise level tends to 0.

Classically both the regularizing operators and sufficient conditions for rates of convergence (so-called source conditions) have been formulated in terms of spectral theory. Over the last decade, variational method have become more and more popular, both for constructing the regularizing operators, and for the formulation of source conditions.

However, for most interesting inverse problems it has not been possible to interpret either spectral or variational source conditions. We will report on recent progress concerning the interpretation of the latter conditions. In particular, we will verify such conditions in terms of classical smoothness conditions for inverse scattering problems, show that they are not only sufficient, but even necessary for rates of convergence in linear inverse problems, and provide characterizations in terms of Besov spaces for many classical linear inverse problems. Our main tool is the well-developed theory of conditional stability estimates.

Zu diesem Vortrag laden wir Sie herzlich ein.
Im Anschluss an den Vortrag stehen Kaffee und Tee im Foyer vor dem SE 40 bereit.

Die Dozentinnen und Dozenten der Mathematik