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SEMINAR OF NUMERICAL ANALYSIS

➢ **WEDNESDAY 11 MAI 2016 - ROOM ME DO 1418 - 16h15**

Prof. Gitta KUTYNIOK (Technical University, Berlin, Germany) will present a seminar entitled:

"Anisotropic Structures and Regularization"

Abstract:

Many important problem classes are governed by anisotropic structures such as singularities concentrated on lower dimensional embedded manifolds, for instance, edges in images or shear layers in solutions of transport dominated equations. While the ability to reliably capture and sparsely represent anisotropic features for regularization of inverse problems is obviously the more important the higher the number of spatial variables is, principal difficulties arise already in two spatial dimensions. Since it was shown that the well-known (isotropic) wavelet systems are not capable of efficiently approximating such anisotropic features, the need arose to introduce appropriate anisotropic representation systems. Among various suggestions, shearlets are the most widely used today. Main reasons for this are their optimal sparse approximation properties within a model situation in combination with their unified treatment of the continuum and digital realm, leading to faithful implementations.

In this talk, we will first discuss the general approach to regularize inverse problems by sparsity-based penalty terms.

We will then focus on the situation of solutions being governed by anisotropic structures, and introduce the representation system of shearlets, in particular, compactly supported shearlets. Finally, we will analyze the effectiveness of shearlets for regularization of exemplary inverse problems such as recovery of missing data and magnetic resonance imaging both theoretically and numerically.

Lausanne, 14 April 2016/ AQ/cr

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