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EINLADUNG

zum

HABILITATIONSVORTRAG

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"Inverse Problems in Mathematical Imaging"

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Abstract: Since the discovery of radiography, only a bit more than a century ago, there came up a lot of ingenious ideas on how to explore the interior of an object without harming it. And today's biological research and medicine would be unimaginable without all the amazing imaging methods which emerged from these approaches like, for example, sonography, computer tomography, or magnetic resonance imaging.
Up to now, this rapid development of new imaging methods did not slow down and recently led to the exploration of coupled physics methods which make use of a combination of different physical effects to gain insights into biological samples.
In this talk, I want to explain the mathematical challenges in determining the physical parameters of a medium from such a coupled physics measurement using the example of photoacoustic tomography. This rather new technology measures the ultrasonic signal which is produced via the photoacoustic effect by exciting the sample with a short laser pulse.
From these photoacoustic measurements, one can get, by retracing the solution of the acoustic wave equation, the initial pressure density in the object, caused by the laser excitation. This already gives a nice qualitative picture of the medium. However, the image will heavily depend on the light distribution of the laser pulse inside the sample so that we will have to solve a second inverse problem to recover the optical parameters of the medium, where the just calculated initial pressure serves as interior measurement data.
Finally, I would like to discuss in a more general setting possible regularisation methods to stabilise the inversion procedure under the effect of noise in the data.

**Montag, 26. Juni 2017,
14:00 Uhr – 15:00 Uhr,**

**Fakultät für Mathematik,
Seminarraum 05, 1.OG.
Oskar-Morgenstern-Platz 1
1090 Wien**

Karlheinz Gröchenig
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