Home

The home page of the Inverse Problems research group has moved to

https://www.helsinki.fi/en/researchgroups/inverse-problems

Inverse Problems Research

Inverse problems research lies at the intersection of pure and applied mathematics. The forward problem corresponding an inverse problem is usually a well defined problem in mathematical physics. What is inverted in inverse problem is the causality: Whereas in a forward problem we start from the causes and end up with the results, in an inverse problem we start with partial knowledge of the causes and the result and infer more about the causes. For example, in direct scattering we know the incoming wave and the scatterer and calculate the scattered wave. In inverse scattering we know some amount of incoming waves and the corresponding scattered waves and deduce some properties of the scatterer (e.g. the shape or number of components).

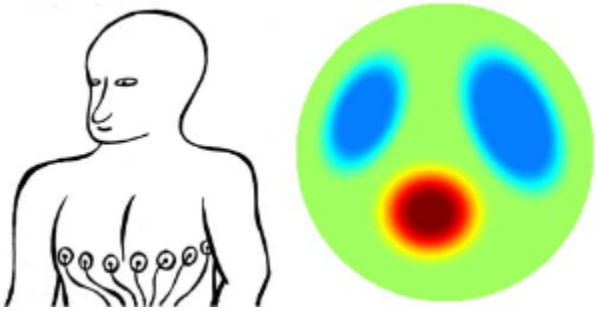
Examples of inverse problems, in addition to the above mentioned inverse scattering, are the inverse conductivity, elasticity and diffusion problems. These have applications in the research of the ionosphere and in various medical imaging methods, namely acoustic, electric impedance and X-ray tomographies, among others.

The inverse problems research groups at the Department of Mathematics and Statistics of University of Helsinki are focused on both theoretical and computational inverse problems, having important applications and implementations in interpreting the data obtained from various measurements in science and engineering. Our research interests spread the whole spectrum from purely mathematical results to R&D work in industry, that is, from theorems to patents. In recent years we have made fundamental contributions in inverse problems in partial differential equations, geometry, and stochastics, with applications in medical imaging, nondestructive testing, and invisibility cloaking.

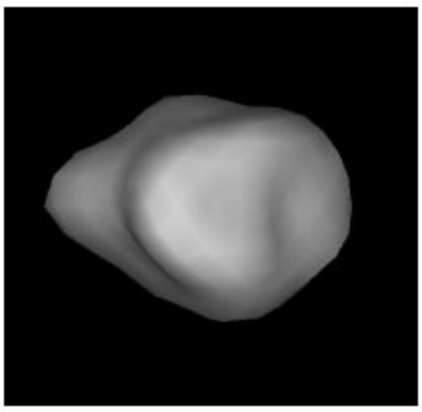
We are part of the Finnish Centre of Excellence in Inverse Problems Research and the Rolf Nevanlinna Institute, and have an active role in the Finnish Inverse Problems Society.

Selected applications

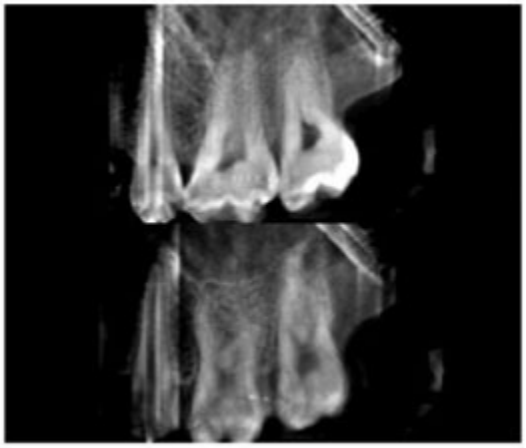
Electric Impedance Tomography



Planetary Science and Astrophysics



3D X-ray Imaging



News

FiDiPro

Prof. Gunther Uhlmann is a Finland

Distinguished Professor for 2013-2017

working in the Inverse Problems Group

Recent Activities

Lecture courses, Spring 2014:

- Inverse problems

Seminars:

- Inverse problems seminar
- Functional analysis seminar

Graduate school:

- Doctoral program in inverse problems

Other information

- Conferences at the CoE webpage
- Research Support