Harmonic functions and their analogues in inverse problems

By

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Abstract

Harmonic functions describe equilibrium states in physical systems such as heat and fluid flow, electricity and gravitation. Mathematically they arise as solutions of the Laplace equation. Similar objects appear in geometry as solutions of the Laplace-Beltrami, eigenfunction or Schrödinger equations on a Riemannian manifold. These objects play an important role in partial differential equations, spectral theory, complex analysis and probability theory.

Various diffuse imaging methods can be modelled by the Laplace equation and its variants. This gives rise to inverse problems where the properties of an unknown medium are reconstructed from boundary measurements of solutions. A prototypical problem of this type is the inverse conductivity problem, also known as the Calderón problem, arising in electrical and seismic imaging. This talk will give an overview of how certain harmonic functions and their counterparts have been used in the solution of inverse problems. We will describe the currently known results with an emphasis on the geometric case. We will also state several open questions.

Biography

Prof. Mikko SALO received his PhD in Applied Mathematics from the University of Helsinki in 2004. He continued his research as a Postdoctoral Researcher at the University of Helsinki in 2005-2008 and as an Academy Research Fellow at the University of Helsinki and the University of Jyväskylä in 2008-2013. Since 2013, he has become a Professor in the Department of Mathematics at the University of Jyväskylä. Prof. Salo’s work is in mathematical analysis, geometry and applications. His research group focuses on fundamental theoretical aspects of inverse problems such as the Calderón problem in electrical imaging and travel time tomography in seismic imaging. He is the Managing Editor of Inverse Problems and Imaging and the Editor of Mathematica Scandinavica and Annales Fennici Mathematici. Prof. Salo is the recipient of the 2012 MediaV Young Researcher Award at the International Conference on Inverse Problems, the 2013 Calderón Prize of the Inverse Problems International Association and the 2014 Väisälä Prize of the Finnish Academy of Science and Letters. In 2019, he was elected a Member of the Finnish Academy of Science and Letters.

Date : 6 December 2023 (Wed)
Time : 4:00pm – 5:00pm
Venue : Lecture Theater H (Lifts 27/28)

All Are Welcome!