Stanford Department of Mathematics Analysis and PDE seminar

Recovering Multiple Coefficients in Inverse Problems

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Abstract

Boundary value inverse problems is a fascinating subject combining PDE and inverse problems. To phrased it in a general setting, consider a differential operator A on the domain $\Omega \subset \mathbb{R}^n$. Provided with information about how solutions to the boundary value problem

$$Au = 0 \quad in\ \Omega, \quad u = f \quad on \quad \partial\Omega$$

behave, what information can we deduce about the differential operator A?
Recently there has been increasing interest in inverse problems involving operators of the type

$$\begin{pmatrix} 0 & \sigma \cdot D \\ \sigma \cdot D & 0 \end{pmatrix} + \begin{pmatrix} q_+ I_2 & \sigma \cdot W \\ \sigma \cdot W & q_- I_2 \end{pmatrix}$$

and

$$\Delta + W \cdot D + D \cdot W + q$$

where $D = -i\nabla$ and $\sigma = (\sigma_1, \sigma_2, \sigma_3)$ is a vector of Pauli matrices with

$$\sigma_1 = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, \ \sigma_2 = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}, \ \sigma_3 = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}.$$

In both cases there are multiple coefficients (W and q) of different orders which we wish to recover. This presents various challenges and provides us with an opportunity to develope some tools. In this talk we discuss some of the ideas behind trying to understand these problems and possible future research in these directions.
Part of this work is done with the collaboration of Mikko Salo, University of Helsinki

Wednesday, October 3rd
4pm
Room 383-N

http://math.stanford.edu/~andras/PDE/PDE.html