DIFFERENTIAL GEOMETRY/PDE/IP SEMINAR

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Padelford C-36
3:45–5PM

Boundary rigidity: a geometric approach

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A Riemannian manifold with boundary is said to be boundary rigid if its metric is uniquely determined by the boundary distance function, that is the restriction of the distance function to the boundary. Loosely speaking, this means that the Riemannian metric can be recovered from measuring distances between boundary points only. The goal is to show that certain classes of metrics are boundary rigid (and, ideally, to suggest a procedure for recovering the metric).

This problem has been extensively studied from PDE viewpoint: the distance between boundary points can be interpreted as a "travel time" for a solution of the wave equation. Hence this becomes a classic Inverse Problem when we have some information about solutions of a certain PDE and want to recover its coefficients. For instance such problems naturally arise in geophysics (when we want to find out what is inside the Earth by sending sound waves), medical imaging etc.

In a joint project with S. Ivanov we suggest an alternative geometric approach to this problem. In our earlier work, using this approach we were able to show boundary rigidity for metrics close to flat ones (in all dimensions), thus giving the first class of boundary rigid metrics of non?constant curvature beyond two dimensions. We were now able to extend this result to include metrics close to a hyperbolic one.

The approach is based on a very transparent scheme, which however has a few blocks where certain formulas have to be carefully selected, and this turns out to be a rather non-trivial task. The purpose of the talk is to explain this scheme and to explain what is needed from those blocks to make it work. The talk assumes no background in inverse problems and is supposed to be accessible to a general math audience (in other words, we will not get into any technical details of the proofs).

For more information about this seminar, visit the DG/PDE Seminar Web page (from the Math Department home page, `www.math.washington.edu`, follow the link **Seminars, Colloquia, and Conferences**).

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