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Inverse boundary value problems on non-compact manifolds

The results concerning elliptic equation are done in collaboration with M. Taylor and G. Uhlmann and the results for hyperbolic equations are obtained with A. Katchalov and Y. Kurylev

In applications many inverse boundary value problems are formulated in unbounded domains, for instance in half-space. Because inverse problem for anisotropic equations are often formulated using Riemannian manifolds we discuss different inverse boundary value problems on non-compact, complete manifolds. On these manifolds we consider inverse problems for elliptic and hyperbolic equations.

For the elliptic equations we formulate result for real-analytic manifolds and give in 2-dimensional case examples of non-homeomorphic manifolds that Cauchy data of harmonic functions coincide.

For hyperbolic inverse problems we consider smooth (non-real analytic) manifolds and consider different types of boundary data. For instance we consider the following measurements:

1. Assume that we know the Cauchy data of all solutions.
2. Assume that we know how much energy one has to use to force the solution to have given the boundary values.
3. Assume that we know boundary values of Schwartz kernel of spectral projections.

We show that all these data are equivalent and show that any of these data is enough to solve the inverse problem.