

Boundary rigidity of Riemannian manifolds

Plamen Stefanov
Purdue University

July 6, 2004

This talk is based on a joint work with Gunther Uhlmann. Let (M, g) be a compact Riemannian manifold with boundary. We study the inverse problem of recovering g (up to an isometry) from the distance function $d(x, y)$ known for all boundary points. This problem arises in differential geometry. Another motivation comes from geophysics. Can one determine the inner structure of the Earth by measuring the first arrivals at the surface of the Earth of seismic waves?

The linearized problem is the recovery of a tensor (up to a potential field) from the geodesic X-ray transform. We show that there is global uniqueness and Holder stability for the non-linear problem for generic simple metrics. To this end, we prove uniqueness and a stability estimate with loss of one derivative for the linear problem for an open dense set of simple metrics including all real analytic (simple) ones.