Mathematics > Classical Analysis and ODEs

Inversion Formulas for the Spherical Means in Constant Curvature Spaces

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The work develops further the theory of the following inversion problem, which plays the central role in the rapidly developing area of thermoacoustic tomography and has intimate connections with PDEs and integral geometry: {\it Reconstruct a function f supported in an n-dimensional ball B, if the spherical means of f are known over all geodesic spheres centered on the boundary of B.} We propose a new unified approach based on the idea of analytic continuation. This approach gives explicit inversion formulas not only for the Euclidean space $\bbr^n$ (as in the original set-up) but also for arbitrary constant curvature space X, including the n-dimensional sphere and the hyperbolic space. The results are applied to inverse problems for a large class of Euler-Poisson-Darboux equations in constant curvature spaces of arbitrary dimension.

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