



Inversion of circular means and the wave equation on convex planar domains

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We study the problem of recovering the initial data of the two dimensional wave equation from values of its solution on a convex bounded domain $\Omega \subset \mathbb{R}^2$. As a main result we establish backprojection type inversion formulas that recover any initial data with support in Ω modulo an explicitly computed smoothing integral operator K_Ω . For circular and elliptical domains the operator K_Ω is shown to vanish identically and hence we establish exact inversion formulas of the backprojection type in these cases. Similar results are obtained for recovering a function from its mean values over circles with centers on $\partial\Omega$. Both reconstruction problems are, amongst others, essential for the hybrid imaging modalities photoacoustic and thermoacoustic tomography.

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