On Inversion of Radon Transforms from Partial Data

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A generalized Radon transform Rf puts into correspondence to a given function $f(x)$ of n variables its integrals over a family of $n-1$ dimensional hypersurfaces (e.g., planes, spheres, etc.). Such transforms play a key role in various models of medical imaging modalities, radar and sonar imaging, industrial non-destructive testing, as well as in several areas of pure mathematics. The major problems related to these transforms are the existence and uniqueness of their inversion, development of stable numerical algorithms for inversion, and their range description.

Many of these problems have been extensively studied during the last couple of decades. In the case, when the Radon transform Rf is known for all surfaces in the given family, there are well developed theories now addressing most of the questions mentioned above. However, if Rf is known only for a part of the family of surfaces (partial data problems), many of these questions are still open.

Our talk will address some new results about the inversion of generalized Radon transforms from partial data. We use techniques of integral equations, integral transforms, and special functions theory to prove uniqueness and stability of the inversion in the case of limited data for spherical Radon transform.

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