

Numerical solution of 3D vector tomography problem with usage of singular value decomposition.

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In this talk the normal Radon transform operator acting on potential vector field on the unit ball is considered. Our goal is to construct singular value decomposition of the operator. The orthogonal bases in the initial space are constructed using harmonic and Jacobi polynomials. A connection between the normal Radon transform of potential vector field and the Radon transform of potential, which is equal to zero on domain boundary, is obtained by author of this paper. Using this connection author showed that the orthogonal bases in the image space are constructed using harmonic and Gegenbauer polynomials. The inversion formula is derived on the basis of obtained singular value decomposition of the normal Radon transform operator. This algorithm was used for solving of 3D vector tomography problem, namely for reconstruction of a potential part of a 3D vector field if its the normal Radon transform is known. For this truncated singular value decomposition is used. Numerical tests for data sets with different noise levels of smooth and discontinuous fields show the validity of the approach.

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