



Invitation to Seminar Talk

Truncated Hilbert transforms arising in limited data computerized tomography.

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Host: Laszlo Erdős

In Computerized Tomography a 2D or 3D object is reconstructed from projection data (Radon transform data) from multiple directions. When the X-ray beams are sufficiently wide to fully embrace the object and when the beams from a sufficiently dense set of directions around the object can be used, this problem and its solution are well understood. When the data are more limited the image reconstruction problem becomes much more challenging; leading to configurations where only a subregion of the object is illuminated from all angles.

In this presentation we consider limited data problems in 2D Computerized Tomography which give rise to truncated versions of the Hilbert transform as operators H_T from $L^2(I)$ to $L^2(J)$ for finite intervals $I, J \subset \mathbb{R}$. We present one framework of tomographic reconstruction from limited data and the method of differentiated back-projection (DBP) which leads to the truncated Hilbert transforms.

We show recent progress in the spectral analysis of operators H_T , based on Sturm-Liouville theory, as well as the asymptotic analysis of the singular value decomposition. Motivated by the property that the inversion of H_T is *severely* ill-posed, we introduce a criterion under which stability is still guaranteed.

Thursday, 30 October 2014, 4:00pm

Meeting Room 3rd Floor, Central Building



2014-30-10

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