

1096-47-2400

Reema Al-Aifari* (reema@alaifari.com), Pleinlaan 2, Vakgroep DWIS, 1050 Brussels, Belgium, and **Alexander Katsevich**. *Analysis of the truncated Hilbert transform arising in limited data tomography.*

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 a limited data problem in 2D Computerized Tomography which gives rise to a restriction of the Hilbert transform as an operator H_T from $L^2(a_2, a_4)$ to $L^2(a_1, a_3)$ for real numbers $a_1 < a_2 < a_3 < a_4$.

We relate the operator H_T to a self-adjoint two-interval Sturm-Liouville problem, which allows to explore the spectrum of $H_T^*H_T$. We find that H_T is not compact but its inversion is ill-posed. With these results, we then address the question of the rate of convergence of the singular values. We conclude by illustrating the properties obtained for the SVD of H_T numerically. (Received September 17, 2013)