Solving the Interior Problem in Computed Tomography Using a Priori Knowledge

Matias Courdurier

Department of Mathematics, University of Washington

matias@math.washington.edu

Abstract

In Computed Tomography (CT) the data measured correspond to the line integrals of an attenuation function. The goal is then to reconstruct the value of the attenuation function from the measurements.

When all the line integrals are measured, there is an inversion formula that recovers the attenuation function in an accurate way. This can change drastically when there truncation of the data set is present. For instance, for the interior problem case, the amount of measurements is not enough to uniquely determine the value of the attenuation function at any point.

Nonetheless, by adding some extra a priori knowledge it might be possible to change this condition.

We will present a result with respect to that. If we add extra knowledge about the support of the attenuation function, and knowledge of the value of the attenuation in a subregion of the object, then the measurements are enough to uniquely determine the attenuation function, and some stability estimates can be obtained.