Limited Angle Photoacoustic Tomography with Line detector

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Abstract

Photoacoustic (or thermoacoustic) tomography is an emerging hybrid imaging method for non-invasive medical diagnosis and fully three-dimensional visualization of biological probes. In this talk we assume that an array of line detectors is used to record the acoustical data. This leads to the mathematical problem of inverting the circular Radon transform (or equivalently reconstructing a function from certain circular means). Recently exact inversion formulas have been found for inverting the circular Radon transform from full data, that is in the case where the set of centers is a closed curve enclosing the unknown function. However, in many practical applications, such as in breast cancer detection with Photoacoustic Tomography, the set of centers does not enclose the unknown function. Theoretically, some features of the object can be recovered stably but so far no stable direct algorithm for inverting such data is known. In this talk we discuss and compare regularization methods for inverting limited angle data.