

# Numerical algorithm for optical tomography with large data sets

Kui Ren\*

One of the major recent advances in optical tomography is the ability to obtain large data set through the use of CCD cameras. Analytical reconstructions in simple geometry show that the use of such large data sets can potentially improve the quality of reconstruction significantly [1].

It is, however, extremely challenging to use such large data set in most model-based numerical reconstruction algorithms because of the overwhelming computational cost involved. Efforts have to be spent on designing new numerical methods to reduce the cost. We will present in this talk a numerical reconstruction procedure that allows us to use extremely large data sets while keeping the computational cost reasonable. The method is a generalization of those in [2]. Numerical examples with synthetic data will be shown to demonstrate the performance of the method.

[1] Z. WANG, G. PANASYUK, V. MARKEL AND J. SCHOTLAND, J., *Experimental demonstration of an analytic method for image reconstruction in optical tomography with large data sets*, Opt. Lett. 30, 2005, pp.3338-3340.

[2] K. REN, G. BAL AND A. H. HIELSCHER, *Frequency domain optical tomography based on the equation of radiative transfer*, SIAM J. Sci. Comput., 28, 2006, pp.1463-1489.

---

\*Department of Applied Physics & Applied Mathematics, Columbia University, New York, NY 10027; kr2002@columbia.edu; <http://www.columbia.edu/~kr2002>