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Benjamin R Holman* (bholman@math.arizona.edu). *Gradual time reversal in thermo- and photo-acoustic tomography within a resonant cavity.*

Thermo-acoustic tomography (TAT) is a hybrid form of medical imaging in which biological tissues are radiated with microwaves to illicit a thermal expansion which produces acoustic pressure waves. These waves are measured outside of the tissue. Traditional reconstruction algorithms for TAT assume that acoustic pressure waves eventually leave a region of interest. We consider a non-standard data acquisition scheme with acoustically reflecting walls that cause pressure waves to reverberate within the region of interest. This type of boundary condition requires a new reconstruction procedure. We investigate convergence of a modified time reversal technique and show that, under certain conditions on the shape of the cavity, this method converges as measurement time increases. This is joint work with Leonid Kunyansky. (Received January 14, 2015)