Meeting: 1003, Atlanta, Georgia, SS 5A, AMS Special Session on Radon Transform and Inverse Problems, I

1003-65-864 **Misha Kilmer*** (misha.kilmer@tufts.edu), Math Dept., Tufts University, Medford, MA, **Eric Miller**, ECE Dept., Northeastern University, Boston, MA, **Marco Enriquez**, Math Program, Tufts University, and **David Boas**, Martinos Center for Biomedical Imaging, MGH and Harvard Medical School, Charlestown, MA. *The Cortical Constraint Method for Diffuse Optical Tomographic Imaging.*

Diffuse optical tomographic (DOT) brain imaging makes use of modulated, near-infrared light transmitted into the head from photodiodes placed on the scalp. Optical detectors measure the photon fluence resulting from the scattering and absorption of photons within the brain. The goal is then to reconstruct the distributions of scattering and absorption properties of the brain tissue from the measurements. However, the limited-view nature of this problem makes this reconstruction very sensitive to noise in the data.

Therefore, we exploit two pieces of prior information. First, it is known that the types of functional activity in the brain for which DOT is intended are geometrically restricted to lie on the cortex. Second, functional regions are modeled as a collection of piecewise constant “hot-spots” bounded by closed curves on the cortex. Thus, we study the recovery of the geometry of an unknown number of 2D closed contours located on a 2D manifold(the cortex) in 3-space.

Given a one-to-one map from the cortical surface to the plane, we describe a new, parametric level set approach to map shapes on the plane to structures on the cortex. Our optimization-based algorithm evolves shapes on the plane while finding optical property values inside each shape. (Received September 30, 2004)