ABSTRACT

"Statistical Inversion in Electrical Impedance and Diffuse Optical Tomography"

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In this presentation, we formulate a statistical inverse problem for the Electrical Impedance Tomography (EIT) and Diffuse Optical Tomography (DOT). EIT is a well known technique to estimate the conductivity distribution γ of a body Ω with unknown electromagnetic properties. DOT is a well known technique to estimate the optical properties mainly diffusion D and absorption μ_a of a body Ω with unknown optical properties. Both EIT and OT are examples of highly nonlinear and severely ill-posed inverse problems. However, due to the broad range of potential applications of EIT and DOT for example non-destructive testing, biomedical imaging for cancer detection etc., designing numerical techniques for their efficient solutions are desirable. In this presentation, we formulate the EIT and DOT problem in the Bayesian framework using mixed total variation (TV) and non-convex ℓ_p regularization prior. We use the Markov Chain Monte Carlo (MCMC) method for sampling the posterior distribution to solve the ill-posed inverse problems in EIT and DOT. We present simulations to estimate the distribution for each pixel for the image reconstruction in EIT and DOT.