1154-65-2372 **Thowhida Akther*** (thowhida@colostate.edu), Department of Mathematics, Fort Collins, CO 80523, **Shyla Kupis** (skupis@clemson.edu), Clemson, SC 29634, and **Taufiquar Khan** (khan@clemson.edu), Clemson, SC 29634. *Reconstructing the Diffusion Coefficient for Diffuse Optical Tomography Problems Using A Variationally Constrained Nonlinear Optimization Framework.* Preliminary report.

Diffuse Optical Tomography (DOT) is an emerging modality for soft tissue imaging since it is a benign form of non-ionizing radiation with various medical applications. However, the inverse problem is unstable during the reconstruction of the diffusion coefficient due to its ill-posedness. To address this issue, typical approaches involve using nonlinear techniques, e.g., the Gauss-Newton method, in which the forward model constraints are implicitly incorporated into the inverse problem. In this paper, we solved the one-dimensional DOT inverse problem by formulating it as a variationally constrained non-linear optimization problem with Newton's iteration and then extended this method to solve the two-dimensional inverse problem. We lastly present the results from our optimization framework and the accuracy of the reconstructed distribution of the diffusion coefficient parameter at different noise levels. (Received September 17, 2019)