1056-35-190 **Bonnie C Jacob***, Dept of Mathematical Sciences, Martin Hall, Clemson University, Clemson, SC 29630. *Maximizing Distinguishability in Optical Tomography through Selection of an Optimal Source: Function Spaces and Inner Products.*

Optical tomography is an imaging technique that reconstructs the optical properties of highly scattering media using near-infrared light. While the benefits of optical tomography could be of tremendous value in areas such as breast cancer detection because of its non-invasive nature, the ill-posedness of the problem means that good reconstructions remain illusive.

We combat the ill-posedness of optical tomography by seeking a source f that will maximize distinguishability of the optical parameters, allowing us to make the problem as well-posed as possible. We investigate the influence of different function spaces and their corresponding inner products on the selection of the optimal source for the diffusion approximation to the radiative transfer equation. The weak formulation corresponding to the diffusion equation does not lead to a self-adjoint operator; we therefore must compute the adjoint for all eight pairs of inner products. We use the power method to numerically determine the optimal source for each function space pair, and compare the solutions. (Received August 13, 2009)