

Abstract Submitted
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Validating a Monte Carlo-based Inverse Model for Determination of Absorption and Scattering Properties of Tissue Phantoms¹ LINDSAY DARKINS, KARTHIK VISHWANATH, Miami University (Oxford) — Diffuse reflectance spectroscopy (DRS) is a non-invasive method to obtain information about a turbid sample using its optical properties. DRS has previously been used in several biomedical applications including diagnosis of normal vs. diseased tissue. A bifurcated optical probe directs light to the sample and collects the reflected light into a spectrometer. The reflectance spectrum is analyzed using an inverse Monte Carlo (MC) model. The model guesses the optical properties of the unknown sample to predict a reflectance spectrum and matches it to the measured reflectance by using reflectance acquired from a reference sample with known optical properties. The optical properties of the unknown sample are adjusted until the error between the modeled and measured reflectance is minimized, which yields the absorption and scattering coefficients. Optical phantoms made with food coloring, hemoglobin, and polystyrene spheres were used to test the inverse MC model. A DRS system was constructed and data collection was controlled by a Raspberry Pi, making this technology portable and practical for clinical settings. The model was able to produce excellent fits of the data, showing that it is working as expected and can be reliably used for later experiments.

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