DETERMINATION OF THE ABSORPTION AND REDUCED SCATTERING COEFFICIENTS OF BIOLOGICAL TISSUES FROM TIME-RESOLVED REFLECTION MEASUREMENTS

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ABSTRACT. The absorption coefficient, μ_a, and reduced scattering coefficient, μ_s', are inferred from simulated measurements of the time-resolved reflectance of a short light pulse from the surface of a semi-infinite turbid medium. The reflectance profile is modeled using the diffusion approximation to the radiative transfer equation. Monte Carlo simulations are used to verify the accuracy of the diffusion model and to generate data for the inversion process. The performance of a widely used inversion process based on the Levenberg-Marquardt algorithm is thoroughly investigated. In particular, this work focuses on determining the optimal distance between the source and the detector. The results of this study indicate that the inverse method is suitable for use in determining the near-infrared optical properties of biological tissues.