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# INFLUENCE OF THE OPTICAL TISSUE PARAMETERS ON THE TRANSMITTED AND REFLECTED SIGNALS FROM A SHORT-PULSE LASER

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Short-pulse lasers have been used for diagnostic purposes and treatment of tumours in biological tissues in the last few decades. The transmitted and reflected signals are strongly influenced by the optical properties of the tissue, namely the optical thickness of the medium, the scattering albedo, and the scattering phase-function. The purpose of this work is to investigate this dependence by means of the numerical solution of the transient radiative transfer equation. This equation is solved using the discrete ordinates method, and the numerical solution is compared with benchmark results evaluated using the Monte Carlo method. The spatial, temporal and angular discretizations are carried out using the finite volume method along with the second-order accurate CLAM scheme, the second-order Runge-Kutta scheme and the SN quadrature, respectively. The Henyey-Greenstein scattering phase-function, characterized by its asymmetry factor, is considered. When the asymmetry factor is high, a fine grid is required and the scattering phase function needs to be normalized to obtain an accurate solution. The calculations are performed for a cubical domain with a short-pulse laser incident on one of the faces. The collimated incident radiation is uniform in space and Gaussian in time. The results show that the intensity of the transmitted signal decreases with the increase of the optical thickness, and increases with the increase of the albedo and/or asymmetry factor. The reflected signal is approximately independent of the optical thickness of the medium, increases with the increase of the albedo, and decreases with the increase of the asymmetry factor.