THE EXISTENCE OF THE DUAL-PEAK REFLECTANCE FOR OPTICAL IMAGING USING ULTRAFAST LASERS

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ABSTRACT.   In this paper the transient Distributions of Ratios of Energy Scattered Or Reflected (DRESOR) method is extended to solve transient radiation transport problem in nonhomogeneous media. The transport process of ultra-short light pulse propagation inside the non-emitting, absorbing, and scattering two-layer media is studied. The fine angular resolution intensity calculated by the DRESOR method shows its advantage in the inverse analysis compared with reflectance. Under the appropriate combination of the pulse width and scattering property of the probed medium, the temporal signal of the reflectance exhibits a direct correlation between the signal magnitude and the location of the interface, that is, the dual-peak in the temporal signal. In a prior work, the authors preliminarily determined two conditions for the correlation to exist. This study extends the prior work with more extensive numerical simulations to rigorously test and revise the conditions of promoting the dual-peak in the temporal reflectance signals.