Optical Methods in Diagnosis

2nd semester, 2015-2016

Homework #7

Multiple-layer tissue model

Develop a multiple layer model and compute R, T and fluence rate distribution for the tissue shown in the diagram below. Let $\Delta r = \Delta z =$ 0.025 mm. Use variable weight photons and Henyey-Greenstein phase function. Assume the incident light is a collimated beam at normal incidence.

	$n_0 = 1$	
$t_1 = 0.05$ mm	$n_1 = 1.4$	$\mu_{a1} = 37$ cm^{-1}, $\mu_{s1} = 480$ cm^{-1}, $g_1 = 0.79$
$t_2 = 2$ mm	$n_2 = 1.4$	$\mu_{a2} = 2.2$ cm^{-1}, $\mu_{s2} = 220$ cm^{-1}, $g_2 = 0.79$
	$n_0 = 1$	

(A) Plot the absorption distribution of <u>scattered photons</u> (1/cm^3) and the impulse response for the fluence rate of the scattered photons (1/cm^2), both in 2D (*r* and *z*).

(B) Assume the incident beam having a Gaussian profile with an e^{-2} radius of 0.5 mm and total power of 1W. Plot the fluence rate (W/cm^2) in 2D (*r* and *z*). Total reflectance *R* is approximately 0.21 and total transmittance *T* is about 0.01.