Optical Methods in Diagnosis

2ne semester, 2015-2016

Homework #5

We will develop a grid structure to store photon absorption information in space. Given $\mu_a = 6\ cm^{-1}$, $\mu_s = 414\ cm^{-1}$, g = 0.91, Henyey-Greenstein phase function, n_1(air) = 1, n_2(tissue) = 1.37, tissue thickness = 1.5 mm.

Develop a grid (3 mm wide, 1.5 mm deep) for your model. Let $\Delta r = \Delta z = 0.1$ mm. Use an infinitely narrow beam with normal incidence at the origin as the source and variable weight photons for 5 sets of 10,000 photons. Calculate reflectance R and transmittance T. R should be about 0.22±0.002 and T should be 0.0145±0.0004. Plot the fluence rate ($1/cm^2$) of scattered photons as a function of *r* and *z*. It is necessary to separate the absorption due to the first photon-tissue interaction from that of subsequently scattered photons.