Optical Methods in Diagnosis

2nd semester, 2015-2016

Homework #3

1. Add scattering to your Monte Carlo simulation and compute the fraction of light reflected and the fraction transmitted for $\mu_s = 90\ cm^{-1}$, $\mu_a = 10\ cm^{-1}$, and isotropic scattering. Assume a tissue slab that has a thickness of two optical depths (d = 0.02 cm) and is index matched with the outside medium. Use five runs of 10,000 photons. The solution of adding-doubling gives reflectance R = 0.3616 and transmittance T = 0.3565. Use fixed weight photons.

2. Modify your Monte Carlo code to use variable weight photons and anisotropic scattering instead of isotropic scattering. Use the Henyey-Greenstein phase function with g = 0.75. Make five runs of 10,000 photons. Van de Hulst gives R=0.09739 and T=0.66096.