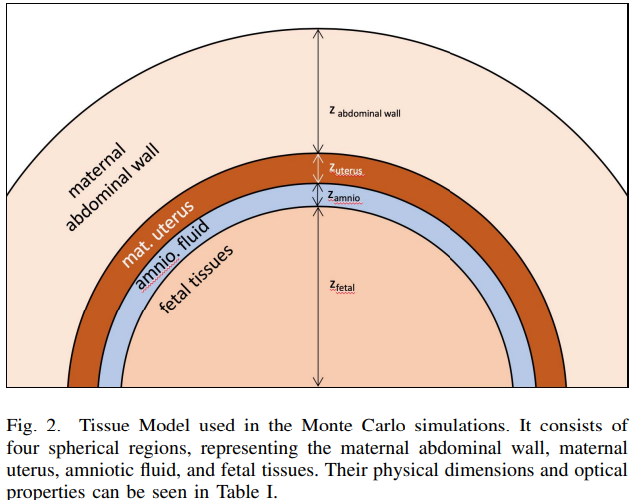
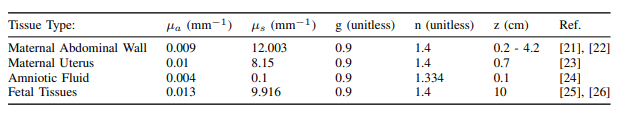
**Monte Carlo Simulation**





The absorption coefficient of the amniotic fluid layer (L3) can be set as a fixed value :

Step 1: For each photon, calculate its absorption in each tissue layer:

where: is the intensity of the photon at time ; is the absorption coefficient of the tissue layer at time , where is the fixed absorption coefficient of the amniotic fluid layer (3rd layer); is the propagation path length of the photon in the tissue layer, which is a function of time .

Step 2: Group photons according to time to obtain the time-domain PPG signal :

where: is the total intensity of all photons received at time , i.e., the value of the PPG signal at time . Through these two steps, the time-domain PPG signal considering the fixed absorption coefficient of the amniotic fluid layer can be calculated.

Step3: After fitting the PPG signal, use two calculation methods in the time domain and frequency domain to obtain separate calculation results:  
PPG time domain signal calculation:

PPG frequency domain power spectrum calculation:

, where: d present the maximum and minimum values of the PPG signal respectively; denotes the main frequency of the fetal heart rate; represents the energy of the main frequency ; represents the total energy of the entire PPG signal.  
  
Then we can analyze whether the values of two methods of calculation of MHR and FHR are consistent.