# Impact of optical parameter shape in optical Monte Carlo for diffuse optic simulations

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Optical Monte Carlo is a stochastic approach to simulating propagation of light. Formulation of optical Monte Carlo is based on the radiative transfer equation, which for unmodulated light can be expressed as [1]

$$s \cdot \nabla \phi(r,s) + \mu_{\mathrm{t}}(r)\phi(r,s) = \mu_{\mathrm{s}}(r) \int \Theta(s \cdot s')\phi(r,s')\,\mathrm{d}s' + q(r,s), \tag{1}$$

where $\phi(r,s)$ is the radiance at position $r$ towards direction $s$, $\mu_{\mathrm{t}}(r) = \mu_{\mathrm{a}}(r) + \mu_{\mathrm{s}}(r)$ is the transport parameter composed of optical absorption $\mu_{\mathrm{a}}(r)$ and optical scattering $\mu_{\mathrm{s}}(r)$, $\Theta(s \cdot s')$ is the phase function describing probability of light scattering from direction $s'$ to direction $s$, and $q(r,s)$ is a light source inside the medium. In addition to radiance experiencing absorption and scattering, as described by the radiative transfer equation, it can experience reflection and transmission on interfaces of refractive index $n(r)$ as described by Snell's law and Fresnel coefficients [3].

In this talk, recent development on optical Monte Carlo based simulation of diffuse optics are discussed. Namely, impact of shape of the optical parameters $\mu_{\mathrm{a}}(r)$, $\mu_{\mathrm{s}}(r)$, and $n(r)$ on light propagation simulations are discussed.

**References**

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