Quiz - ECS 275A

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June 7th, 2017

Q: What is the meaning of a BSSRDF?

A: Bidirectional Scattering-Surface Reflectance Distribution Function (BSSRDF) is the generalization of the Bidirectional Reflectance Distribution Function (BRDF) which describes the light transport between any two rays that hit a surface, whereas the BRDF assumes the light entering a material leaves the material at the same position. The difference between BSSRDF and BRDF is shown in Figure 1.

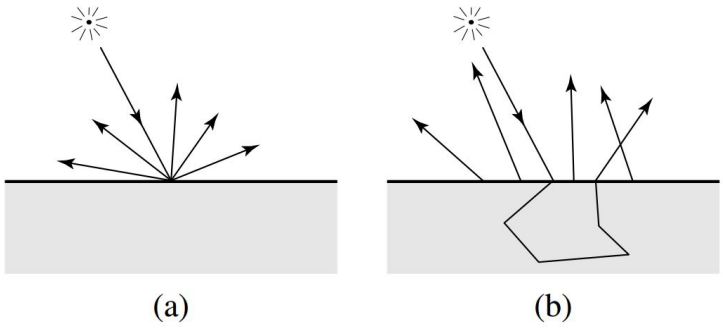

Figure 1: Scattering of light in (a) a BRDF, and (b) a BSSRDF

Q: Suppose we need to sample a phase function $p(A, B)$ depending only on the angle theta between the unit vector A for the incoming direction and B for the scattering direction, for example, to do Monte Carlo light tracing in a participating medium. Given the vector A, how can we choose B so that its probability density is $p(A, B)$.

A: We start by calculating the inverse cumulative distribution function of $p(A, B)$. Then we generate a random variable u over the interval $[0, 1)$. The resulting sample $F^{-1}(u)$ matches the the phase/distribution function $p(A, B)$.