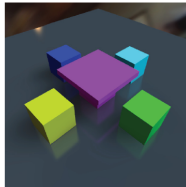
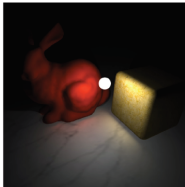
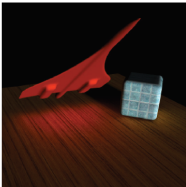
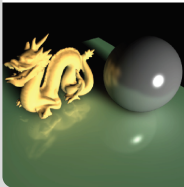


Glossy Reflections

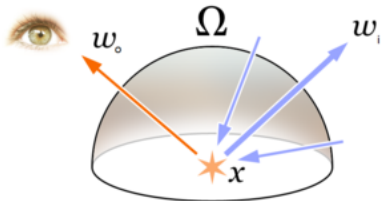
Kai Westerkamp

Lehrstuhl für Computergrafik



$$L(x, o) = L_e(x, o) + \int_{\Omega^+} f_r(i, x, o) L_i(x, i) \max(0, i \cdot n) di$$

- x Oberflächenpunkt
- i Einfall Richtung (incoming)
- o Ausfall Richtung (outgoing)
- Ω^+ Positive Hemisphäre
- $f_r(i, x, o)$ BRDF



$$L_i(x, i) = L(y, -i)$$

$$y = ray(x, i)$$

Virtual Point Lights

$$G(v; p, \lambda, c) = c \cdot e^{\lambda(v \cdot p - 1)}$$

- p Mittelachse
- λ Sharpness
- c Skalar

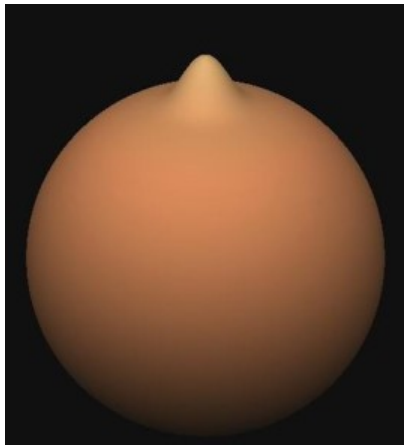
Schreibweisen:

$$G_I(v) = G(v; p_I, \lambda_I) = G(v; p_I, \lambda_I, 1)$$

Eigenschaften:

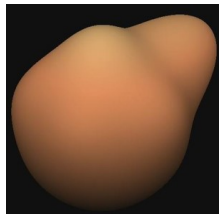
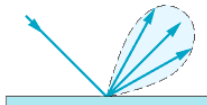
$$G_1(v) \cdot G_2(v) = G_3(v)$$

$$\int_{\Omega} G_1(v) \cdot G_2(v) dv \approx c(v) G_3(v)$$



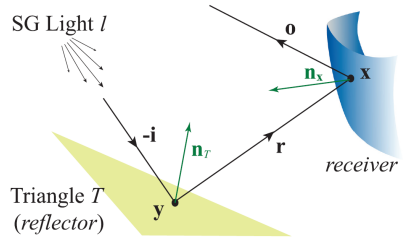
$$G(v; p, \lambda, c) = c \cdot e^{\lambda(v \cdot p - 1)}$$

- Summe an SG eignen sich zum Approximieren von BRDF
- Diffuse: SG mit $\lambda = 0$;
- Spekular: 1-9 SG
- Lichtquellen als SG

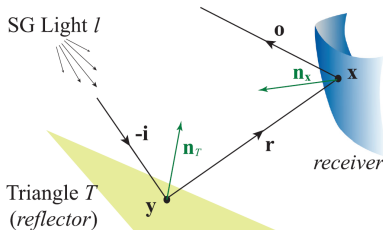


Algorithmus Übersicht

- One Bounce Interreflection
- Baumstruktur
- Sichtbarkeit



One Bounce Interreflection



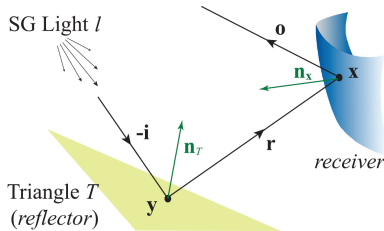
Receiver

$$L(x, o) = \int_{\Omega^T} f_r(-r, x, o) L_i(x, -r) \max(0, -r \cdot n_x) dr$$

Reflector

$$L(y, r) = \int_{\Omega} f_r(i, y, r) G_l(i) \max(0, i \cdot n_T) di$$

One Bounce Interreflection



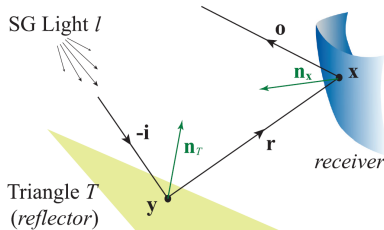
Reflector

$$L(y, r) = \int_{\Omega} f_r(i, y, r) G_l(i) \max(0, i \cdot n_T) di$$

BRDF als Summe von SG
Cos Term ist "wirklich glatt"

$$L(y, r) \approx F(r) G(r; i_r, \lambda_r)$$

One Bounce Interreflection

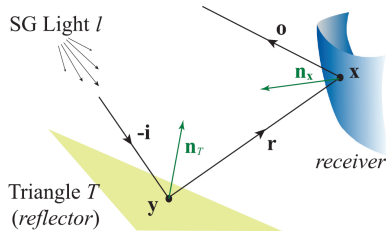


Receiver

$$L(x, o) = \int_{\Omega_T} f_r(-r, x, o) L_i(x, -r) \max(0, -r \cdot n_x) dr$$

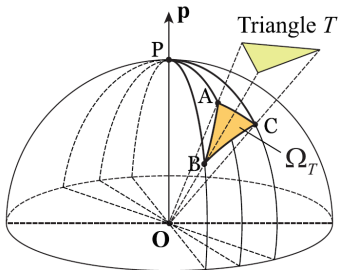
BRDF als Summe von SG
Cos Term ist "wirklich glatt"
 L_i ist das reflektierte Licht

One Bounce Interreflection

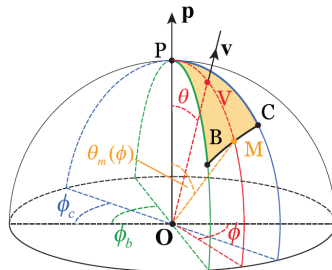


$$L(x, o) \approx H(r'_h) \int_{\Omega_T} G(r; r_h, \lambda_h, c_h) dr$$

$$\int_{\Omega^T} G(v; p, \lambda) dv$$



(a)



(b)

$$\Omega_t = \Omega_{\triangle ABC} = \Omega_{\triangle PBC} - \Omega_{\triangle PAB} - \Omega_{\triangle PCA}$$

One Bounce Interreflection

