Multiple Importance Sampling

Reflection of a circular light source by a rough surface

Sampling the light source \[ \int f(x)g(x)dx \]

Sampling the BRDF

Pat Hanrahan, Spring 2002
Multiple Importance Sampling

Two sampling techniques

\[ X_{1,j} \sim p_1(x) \quad X_{2,j} \sim p_2(x) \]

\[ Y_{1,j} = \frac{f(X_{1,j})}{p_1(X_{1,j})} \quad Y_{2,j} = \frac{f(X_{2,j})}{p_2(X_{2,j})} \]

Form weighted combination of samples

\[ Y_j = w_1 Y_{1,j} + w_2 Y_{2,j} \]

The balance heuristic

\[
 w_j(x) = \frac{p_j(x)}{p_1(x) + p_2(x)} \implies p(x) = w_1(x)p_1(x) + w_2(x)p_2(x)
\]