

Errata for:

Wavelet Radiance Transport for Interactive Indirect Lighting

This errata applies to the version of the paper published in *Rendering Techniques 2006 (Eurographics Symposium on Rendering)* [KTHS06]. The versions currently available online should have been updated already.

- p. 4, equation 3
Correct form of the incident transport operator:

$$(TL)(\mathbf{x}, \mathbf{x} \leftarrow \mathbf{y}) = \int_{\omega} f_r(\omega, \mathbf{y}, \mathbf{y} \rightarrow \mathbf{x}) V(\mathbf{x}, \mathbf{y}) [\omega \cdot \mathbf{n}_{\mathbf{y}}] L(\mathbf{y}, \omega) d\omega$$

where $f_r(\omega, \mathbf{y}, \mathbf{y} \rightarrow \mathbf{x}) V(\mathbf{x}, \mathbf{y}) [\omega \cdot \mathbf{n}_{\mathbf{y}}]$ is the kernel, $k(\mathbf{x}, \mathbf{y}, \omega)$.

- p. 5, equation 4
Our 8-dimensional formulation is incorrect. 8-dimensional formulation is probably possible, but a correct 6-dimensional version is as follows:

$$T_{r,s} = \int_{\mathbf{x}, \mathbf{y}, \omega} k(\mathbf{x}, \mathbf{y}, \omega) \frac{[\mathbf{x} \leftarrow \mathbf{y} \cdot \mathbf{n}_{\mathbf{y}}]}{r_{\mathbf{xy}}^2} b_s^s(\mathbf{y}) b_a^s(\omega) b_s^r(\mathbf{x}) b_a^r(\mathbf{x} \leftarrow \mathbf{y}) d\omega d\mathbf{x} d\mathbf{y}$$

Where $K(\mathbf{x}, \mathbf{y}, \omega) = k(\mathbf{x}, \mathbf{y}, \omega) \frac{[\mathbf{x} \leftarrow \mathbf{y} \cdot \mathbf{n}_{\mathbf{y}}]}{r_{\mathbf{xy}}^2}$.

- p. 6, section 4.3.2
'Where K refers to the kernel' \rightarrow 'With K as defined in equation 4.'

Proof

Each transport coefficient is obtained by operating on the sending basis function $b_s^s(\mathbf{y}) b_a^s(\omega)$ and projecting the result on the receiving one $b_s^r(\mathbf{x}) b_a^r(\alpha)$:

$$\begin{aligned} T_{r,s} &= \langle \widehat{b_s^r b_a^r} | \mathcal{T} b_s^s b_a^s \rangle \\ &= \langle \widehat{b_s^r b_a^r} | \int_{\omega} k(\mathbf{x}, \mathbf{y}, \omega) b_s^s(\mathbf{y}) b_a^s(\omega) d\omega \rangle \end{aligned}$$

$\widehat{b_s^r b_a^r}$ refers to the dual of $b_s^r b_a^r$, but since our basis is orthonormal $\widehat{b_s^r b_a^r} = b_s^r b_a^r$. The inner product is evaluated over position \mathbf{x} and direction $\mathbf{x} \leftarrow \mathbf{y}$ as follows:

$$= \int_{\mathbf{x}, \mathbf{y}} b_s^r(\mathbf{x}) b_a^r(\mathbf{x} \leftarrow \mathbf{y}) \frac{[\mathbf{x} \leftarrow \mathbf{y} \cdot \mathbf{n}_{\mathbf{y}}]}{r_{\mathbf{xy}}^2} \int_{\omega} k(\mathbf{x}, \mathbf{y}, \omega) b_s^s(\mathbf{y}) b_a^s(\omega) d\omega d\mathbf{x} d\mathbf{y}$$

Since we used area-based integration instead of hemispherical, we need to convert between the differential measures with $\frac{[\mathbf{x} \leftarrow \mathbf{y} \cdot \mathbf{n}_{\mathbf{y}}]}{r_{\mathbf{xy}}^2}$. Technically a visibility term $V(x, y)$ would be needed as well, but it is already included in $k(\mathbf{x}, \mathbf{y}, \omega)$.

So the final form:

$$T_{r,s} = \int_{\mathbf{x}, \mathbf{y}, \omega} k(\mathbf{x}, \mathbf{y}, \omega) \frac{[\mathbf{x} \leftarrow \mathbf{y} \cdot \mathbf{n}_{\mathbf{y}}]}{r_{\mathbf{xy}}^2} b_s^s(\mathbf{y}) b_a^s(\omega) b_s^r(\mathbf{x}) b_a^r(\mathbf{x} \leftarrow \mathbf{y}) d\omega d\mathbf{x} d\mathbf{y}$$

References

- [KTHS06] Janne Kontkanen, Emmanuel Turquin, Nicolas Holzschuch, and François Sillion. Wavelet radiance transport for interactive indirect lighting. In Wolfgang Heidrich and Thomas Akenine-Möller, editors, *Rendering Techniques 2006 (Eurographics Symposium on Rendering)*. Eurographics, jun 2006.