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:

$$(\mathcal{T}L)(\mathbf{x}, \mathbf{x} \leftarrow \mathbf{y}) = \int_{\omega} f_r(\omega, \mathbf{y}, \mathbf{y} \rightarrow \mathbf{x}) V(\mathbf{x}, \mathbf{y}) \lfloor \omega \cdot \mathbf{n_y} \rfloor L(\mathbf{y}, \omega) \mathbf{d}\omega$$

  where $f_r(\omega, \mathbf{y}, \mathbf{y} \rightarrow \mathbf{x}) V(\mathbf{x}, \mathbf{y}) \lfloor \omega \cdot \mathbf{n_y} \rfloor$ 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:

$$T_{r,s} = \int_{\mathbf{x},\mathbf{y},\omega} k(\mathbf{x}, \mathbf{y}, \omega) \frac{\lfloor \mathbf{x} \leftarrow \mathbf{y} \cdot \mathbf{n_y} \rfloor}{r^2_{\mathbf{xy}}} b^s_s(\mathbf{y}) b^s_a(\omega) b^r_s(\mathbf{x}) b^r_a(\mathbf{x} \leftarrow \mathbf{y}) \mathbf{d}\omega \mathbf{dxdy}$$

  Where $K(\mathbf{x}, \mathbf{y}, \omega) = k(\mathbf{x}, \mathbf{y}, \omega) \frac{\lfloor \mathbf{x} \leftarrow \mathbf{y} \cdot \mathbf{n_y} \rfloor}{r^2_{\mathbf{xy}}}$.

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

Proof

Each transport coefficient is obtained by operating on the sending basis function $b^s_s(\mathbf{y}) b^s_a(\omega)$ and projecting the result on the receiving one $b^r_s(\mathbf{x}) b^r_a(\alpha)$:

$$T_{r,s} = \langle \widehat{b^r_s b^r_a} | \mathcal{T} b^s_s b^s_a \rangle$$

$$= \langle \widehat{b^r_s b^r_a} | \int_{\omega} k(\mathbf{x}, \mathbf{y}, \omega) b^s_s(\mathbf{y}) b^s_a(\omega) \mathbf{d}\omega \rangle$$

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

$$= \int_{\mathbf{x},\mathbf{y}} b^r_s(\mathbf{x}) b^r_a(\mathbf{x} \leftarrow \mathbf{y}) \frac{\lfloor \mathbf{x} \leftarrow \mathbf{y} \cdot \mathbf{n_y} \rfloor}{r^2_{\mathbf{xy}}} \int_{\omega} k(\mathbf{x}, \mathbf{y}, \omega) b^s_s(\mathbf{y}) b^s_a(\omega) \mathbf{d}\omega \mathbf{dxdy}$$

Since we used area-based integration instead of hemispherical, we need to convert between the differential measures with $\frac{\lfloor \mathbf{x} \leftarrow \mathbf{y}, \mathbf{n_y} \rfloor}{r^2_{\mathbf{xy}}}$. 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:

$$T_{r,s} = \int_{\mathbf{x},\mathbf{y},\omega} k(\mathbf{x}, \mathbf{y}, \omega) \frac{\lfloor \mathbf{x} \leftarrow \mathbf{y} \cdot \mathbf{n_y} \rfloor}{r^2_{\mathbf{xy}}} b^s_s(\mathbf{y}) b^s_a(\omega) b^r_s(\mathbf{x}) b^r_a(\mathbf{x} \leftarrow \mathbf{y}) \mathbf{d}\omega \mathbf{dxdy}$$

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.