Errata for Watt

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Errata 1 (p. 7) Incorrect transformation matrices

The transformation matrices shown do not agree with what is shown in Figure 1.3; the correct matrix order would be as follows:

\[
T_2RT_1 = \begin{bmatrix}
1 & 0 & 0 & T_x \\
0 & 1 & 0 & T_y \\
0 & 0 & 1 & 0 \\
0 & 0 & 0 & 1 \\
\end{bmatrix}
\begin{bmatrix}
\cos \theta & -\sin \theta & 0 & 0 \\
\sin \theta & \cos \theta & 0 & 0 \\
0 & 0 & 1 & 0 \\
0 & 0 & 0 & 1 \\
\end{bmatrix}
\begin{bmatrix}
1 & 0 & 0 & -T_x \\
0 & 1 & 0 & -T_y \\
0 & 0 & 1 & 0 \\
0 & 0 & 0 & 1 \\
\end{bmatrix}
\]

Errata 2 (p. 23) Intersections with quartics

There is an error in the \( b \) coefficient for intersections with quartics in §1.4.5. It currently reads:

\[ b = d(Ax_1x_d + \ldots) \]

It should be:

\[ b = 2(Ax_1x_d + \ldots) \]

The complete formulae appear below:

\[
a = Ax_1^2 + Ey_1^2 + Hz_1^2 + 2Bx_1yd + 2Cx_1z_d + 2Fy_1z_d \\
b = d(Ax_1x_d + B(x_1yd + x_1y_1) + C(x_1z_d + x_dz_1) + Dx_d + Ey_1yd + F(y_1yd + y_dz_1) + Gy_1 + Hz_1z_d + I_z_d \\
c = Ax_1^2 + Ey_1^2 + Hz_1^2 + 2Bx_1y_1 + 2Cx_1z_1 + 2Dx_1 + 2Fy_1z_1 + 2Gy_1 + 2I_z_1 + J
\]
Errata 3 (p. 24) *Equation for refraction*

Watt confuses the notation in the derivation of the formula for calculating the cosine of the index of refraction. He uses $\mu$ in the equations in the text, but $\eta$ in figure 1.16; these are the same. The angle of incidence is $\phi$ and the angle of refraction is $\theta$.

There is also an error in the formula for computing $\cos \theta$; the last equation on p. 24 should read:

$$\cos \theta = \sqrt{1 - \mu^2(1 - \cos^2 \theta)}$$

There is also an error in the computed transmission direction $T$. The equation in the text is incorrect, while the one in figure 1.16 is correct. For convenience, the entire list of correct equations is repeated below:

$$T = \mu I - (\cos \theta - \mu \cos \phi) N$$

$$\mu = \frac{\mu_1}{\mu_2}$$

$$\cos \theta = \sqrt{1 - \mu^2(1 - \cos^2 \theta)}$$

Errata 4 (p. 427) *YIQ - RGB conversion matrix*

The YIQ matrix on page 427 (§15.2.3) should read:

$$\begin{bmatrix}
  Y \\
  I \\
  Q \\
\end{bmatrix} = \begin{bmatrix}
  0.299 & 0.587 & 0.114 \\
  0.596 & -0.275 & -0.321 \\
  0.212 & -0.523 & 0.311 \\
\end{bmatrix} \begin{bmatrix}
  R \\
  G \\
  B \\
\end{bmatrix}$$