

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:

$$\begin{aligned} \mathbf{T}_2 \mathbf{R} \mathbf{T}_1 &= \begin{bmatrix} 1 & 0 & 0 & T_x \\ 0 & 1 & 0 & T_y \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \cos \theta & -\sin \theta & 0 & 0 \\ \sin \theta & \cos \theta & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 & -T_x \\ 0 & 1 & 0 & -T_y \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \\ &= \begin{bmatrix} \cos \theta & -\sin \theta & 0 & (-T_x \cos \theta + T_y \sin \theta + T_x) \\ \sin \theta & \cos \theta & 0 & (-T_x \sin \theta - T_y \cos \theta + T_y) \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \end{aligned}$$

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:

$$b = d(Ax_1x_d + \dots)$$

It should be:

$$b = 2(Ax_1x_d + \dots)$$

The complete formulae appear below:

$$\begin{aligned} a &= Ax_d^2 + Ey_d^2 + Hz_d^2 + 2Bx_dy_d + 2Cx_dz_d + 2Fy_dz_d \\ b &= d(Ax_1x_d + B(x_1y_d + x_dy_1) + C(x_1z_d + x_dz_1) + \\ &\quad Dx_d + Ey_1y_d + F(y_1z_d + y_dz_1) + Gy_d + Hz_1z_d + Iz_d) \\ c &= Ax_1^2 + Ey_1^2 + Hz_1^2 + 2Bx_1y_1 + 2Cx_1z_1 + 2Dx_1 + 2Fy_1z_1 + \\ &\quad 2Gy_1 + 2Iz_1 + J \end{aligned}$$

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 μ in the equations in the text, but η in figure 1.16; these are the same. The angle of incidence is ϕ and the angle of refraction is θ .

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 \mathbf{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:

$$\begin{aligned}\mathbf{T} &= \mu \mathbf{I} - (\cos \theta - \mu \cos \phi) \mathbf{N} \\ \mu &= \frac{\mu_1}{\mu_2} \\ \cos \theta &= \sqrt{1 - \mu^2(1 - \cos^2 \theta)}\end{aligned}$$

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

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

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