

Line-element equations for thresholds and scaling

Colour-discrimination function $f(Y_r)=\Delta Y_r$, $u_r=\ln Y_r$ [0]

$$\Delta Y_r = 1/[(1+Y_r)(2+Y_r)] = 1/[1+Y_r] - 1/[2+Y_r] \quad Y_r = \sqrt{2} e^{ku_r}$$

$$f_u(Y_u) = \frac{\Delta Y_r}{\Delta Y_{ru}} = \frac{1+Y_r}{2} - \frac{2+Y_r}{3} \quad Y_r = Y/Y_u \quad [1]$$

$$F_u(Y_r) = \int \frac{f'_u(Y_r)}{f_u(Y_r)} dY_r = \int \frac{dY_r}{1+Y_r} - \int \frac{dY_r}{2+Y_r} \quad [2]$$

Example for $L^*(Y_r)$ & ΔY_r with $Y_r = Y/Y_u = 1$:

$$L^*_u(Y_r) = \frac{L^*(Y_r)}{L^*(Y_{ru})} = \frac{\ln(1+Y_r)}{\ln(2)} - \frac{\ln(1+0,5 Y_r)}{\ln(1,5)} \quad [3]$$

$$f_u(Y_r) = \frac{\Delta Y_r}{\Delta Y_{ru}} = \frac{1+Y_r}{2} - \frac{1+0,5 Y_r}{1,5} \quad [4]$$

see K. Richter (1985), Computer Graphic and Colorimetry, p. 113–127

<http://color.li.tu-berlin.de/BUA4BF.PDF>