

Line-element equations for thresholds and scaling

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

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

$$f_u(Y_r) = \frac{\Delta Y_u}{\Delta Y_{ru}} = \frac{1+b Y_r}{1+b} - \frac{1+0,5b Y_r}{1+0,5b} \quad b=1, Y_r=Y/Y_u \quad [1]$$

$$F_u(Y_r) = \int \frac{f'_u(Y_r)}{f_u(Y_r)} dY_r = \int \frac{b dY_r}{1+b Y_r} - \int \frac{0,5b dY_r}{1+0,5b Y_r} \quad [2]$$

Example for $L^*(Y_r)$ & ΔY with $Y_r=Y/Y_u$, $Y_{ru}=1$, $b=1$:

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

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

see K. Richter (1996), Computer Graphic and Colorimetry, p. 113–127

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