Line-element equations for thresholds and scaling

Colour-discrimination function $f(x) = \Delta Y = \Delta x\, Y_u$ [0]

$\Delta Y = 1/[(1+x)(2+x)] = 1/[1+x] - 1/[2+x]$ $\quad x = \sqrt{2}\, e^{k(u-u_0)}$

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

$$F_u(x) = \int \frac{f'_u(x)}{f_u(x)}\,dx = \int \frac{1}{1+x}\,dx - \int \frac{1}{2+x}\,dx \qquad [2]$$

Example for $L^*(x)$ & ΔY with $x = Y/Y_u$, $x_u = 1$:

$$L^*_u(x) = \frac{L^*(x)}{L^*(x_u)} = \frac{\ln(1+x)}{\ln(2)} - \frac{\ln(1+0{,}5\,x)}{\ln(1{,}5)} \qquad [3]$$

$$f_u(x) = \frac{\Delta Y}{\Delta Y_u} = \frac{1+x}{2} - \frac{1+0{,}5x}{1{,}5} \qquad [4]$$

see K. Richter (1985), Computer Graphic and Colorimetry, p. 113−127
http://color.li.tu-berlin.de/BUA4BF.PDF