

## Line-element equations according to CIE 230:2019

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

$$\Delta Y_r = (A_1 + A_2 Y_r) / A_0 \quad A_0 = 1,5, \quad A_1 = 0,0170, \quad A_2 = 0,0058$$

$$f_u(Y_r) = \frac{\Delta Y_r}{\Delta Y_{ru}} = \frac{1 + b Y_r}{1 + b} \quad b = A_2 Y_u / A_1 \quad Y_r = Y / Y_u \quad [1]$$

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

Example for  $L^*(Y_r)$  &  $\Delta Y_r$  with  $Y_{ru} = Y_r / Y_u = 1$ ,  $b = 6,141$ :

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

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