

CIELAB lightness L^* normalized to the background lightness L^*_u

$$\log \left(L^*/L^*_u \right)$$

$$L^*/L^*_u = s(Y/Y_u)^n - d \quad (Y_n=100, Y_u=18, s=116, n=1/3, d=16) \quad [1a]$$

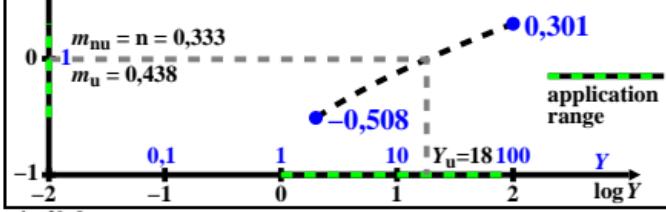
$$L^* = r(Y/Y_u)^n - d \quad (r=s(Y_u/Y_n)^n=65,49, L^*_u=r-d) \quad [1b]$$

$$L^*/L^*_u = g(Y/Y_u)^n - h \quad (g=r/(r-d)=1,32, h=d/(r-d)=0,32) \quad [1c]$$

$$\log \left[\left(L^*/L^*_u + h \right) / g \right] = n \log \left(Y/Y_u \right) \quad [1d]$$

$$\ln \left[\left(L^*/L^*_u + h \right) / g \right] = \ln(10) n \log \left(Y/Y_u \right) \quad [1e]$$

$$\left(L^*/L^*_u + h \right) / g = e^{\ln(10) n \log \left(Y/Y_u \right)} \quad [1f]$$



hep30-5a

CIELAB tristimulus value difference ΔY normalized to ΔY_u

$$\log \left(\Delta Y / \Delta Y_u \right)$$

$$\Delta Y / \Delta Y_u = s(Y/Y_u)^n - d \quad (Y_n=100, Y_u=18, s=116, n=1/3, d=16) \quad [1a]$$

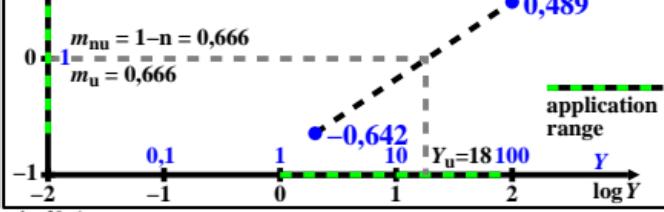
$$L^* = r(Y/Y_u)^n - d \quad (r=s(Y_u/Y_n)^n=65,49, L^*_u=r-d) \quad [1b]$$

$$dY = [Y_n / (n s)] (Y/Y_u)^{1-n} \quad [2c]$$

$$dY_u = [Y_u / (n s)] (Y_u/Y_n)^{1-n} = 1,4602 \quad [2d]$$

$$dY / dY_u = (Y/Y_u)^{1-n} \quad [2e]$$

$$\log(dY/dY_u) = (1-n) \log(Y/Y_u) \quad [2f]$$



hep30-6a

CIELAB-Y sensitivity normalized to $(\Delta Y/Y)_u$

$$\log \left[(\Delta Y/Y) / (\Delta Y/Y)_u \right]$$

$$S_r/S_{ru} = (\Delta Y/Y)/(\Delta Y/Y)_u \quad [1a]$$

$$100L^* = s(Y/Y_u)^n - d \quad (Y_n=100, Y_u=18, s=116, n=1/3, d=16) \quad [1a]$$

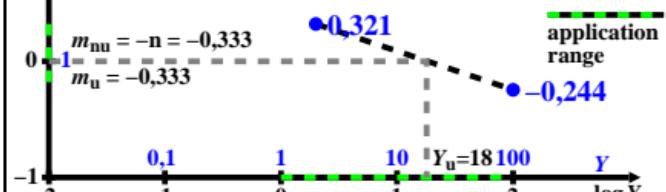
$$L^* = r(Y/Y_u)^n - d \quad (r=s(Y_u/Y_n)^n=65,49, L^*_u=r-d) \quad [1b]$$

$$dY/Y = [(Y_n / (n s))] (Y/Y_u)^{1-n} / Y \quad [3c]$$

$$(dY/Y)_u = [(Y_n / (n s))] (Y_u/Y_n)^{1-n} / Y_u \quad [3d]$$

$$(dY/Y) / (dY/Y)_u = (Y/Y_u)^{-n} \quad [3e]$$

$$\log \left[(dY/Y) / (dY/Y)_u \right] = (-n) \log(Y/Y_u) \quad [3f]$$



hep30-7a

hep30-7n

CIELAB-Y contrast normalized to $(Y/\Delta Y)_u$

$$\log \left[(Y/\Delta Y) / (Y/\Delta Y)_u \right]$$

$$C_r/C_{ru} = (Y/\Delta Y)/(Y/\Delta Y)_u \quad [1a]$$

$$100L^* = s(Y/Y_u)^n - d \quad (Y_n=100, Y_u=18, s=116, n=1/3, d=16) \quad [1a]$$

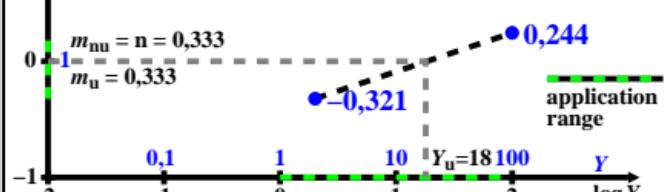
$$L^* = r(Y/Y_u)^n - d \quad (r=s(Y_u/Y_n)^n=65,49, L^*_u=r-d) \quad [1b]$$

$$Y/dY = Y / \{ [(Y_n / (n s))] (Y/Y_u)^{1-n} \} \quad [4c]$$

$$(Y/Y_u) = Y_u / \{ [(Y_n / (n s))] (Y_u/Y_n)^{1-n} \} \quad [4d]$$

$$(Y/dY) / (Y/dY)_u = (Y/Y_u)^n \quad [4e]$$

$$\log \left[(Y/dY) / (Y/dY)_u \right] = (n) \log(Y/Y_u) \quad [4f]$$



hep30-8a