

http://130.149.60.45/~farbmetrikk/ME12/ME12L0N1.TXT/.PS; start output
N: No Output Linearization (OL) data in File (F), Startup (S) or Device (D)

line element of Stiles (1946) with „color values“ P, D, T
three separate color signal functions

$$F(P) = i \ln(1+9P)$$

$$F(D) = j \ln(1+9D)$$

$$F(T) = k \ln(1+9T)$$

Taylor-derivations:

$$\Delta F(P, D, T) = \frac{dF}{dP} \Delta P + \frac{dF}{dD} \Delta D + \frac{dF}{dT} \Delta T \\ = \frac{9i}{1+9P} \Delta P + \frac{9j}{1+9D} \Delta D + \frac{9k}{1+9T} \Delta T$$

ME12-1, B4_47_1

line element of Vos & Walraven (1972) with „color values“ P, D, T
three separate color signal functions

$$F(P) = -2i\sqrt{P}$$

$$F(D) = -2j\sqrt{D}$$

$$F(T) = -2k\sqrt{T}$$

Taylor-derivations:

$$\Delta F(P, D, T) = \frac{dF}{dP} \Delta P + \frac{dF}{dD} \Delta D + \frac{dF}{dT} \Delta T \\ \Delta F(P, D, T) = \frac{i}{\sqrt{P}} \Delta P + \frac{j}{\sqrt{D}} \Delta D + \frac{k}{\sqrt{T}} \Delta T$$

ME12-2, B4_47_2

functions $q[k(x-u)]$

„achromatic signal“-description

with $x = \log L$ (L = luminance)
 $u = \log L_u$ (L_u = surround luminan.)

$$q[k(x-u)] = 1 + 1/[1 + \sqrt{2}e^{k(x-u)}]$$

function values:

$$q[k(x-u) \rightarrow +\infty] = 1$$

$$q[k(x-u) = 0] = \sqrt{2}$$

$$q[k(x-u) \rightarrow -\infty] = 2$$

ME12-3, B4_48_1

„achromatic signal“-description

functions $Q_{1m}[k(x-u)]$

with $x = \log L$ (L = luminance)
 $u = \log L_u$ (L_u = surround luminan.)

$$Q_{1m}[k(x-u)] = \frac{1}{\ln 2} \ln q[k(x-u)] - m$$

function values with $l = m = 1$:

$$Q[k(x-u) \rightarrow +\infty] = 1$$

$$Q[k(x-u) = 0] = 0$$

$$Q[k(x-u) \rightarrow -\infty] = -1$$

ME12-4, B4_48_2

„achromatic signal“ discrimination as function of relative light density
 $h = \ln L / \ln k(x-u)$ \ln = natural log,

$$Q' = \frac{d}{dH} [\ln(1+1/(1+\sqrt{2}H))] / \ln \sqrt{2} \\ = -\sqrt{2}/[ln(\sqrt{2}(1+\sqrt{2}H)(2+\sqrt{2}H))]$$

function values:

$$Q'[k(x-u) \rightarrow +\infty] = 0$$

$$Q'[k(x-u) = 0] = -0,5$$

$$Q'[k(x-u) \rightarrow -\infty] = 0$$

ME12-5, B4_49_1

luminance discrimination possibility $L/\Delta L$ as function of H

with: $L = 10^H H = e^k$ $\ln = \text{natural log}$

$$dL/dx = \ln 10 L \quad dH/dx = k \quad dH/dL = 1/k$$

it follows: $L/\Delta L = [k(H)/(k(H)\ln 10)]$

$$\frac{L}{\Delta L} = \text{const } H / [(1+\sqrt{2}H)(2+\sqrt{2}H)]$$

$$Q'[k(x-u) \rightarrow +\infty] = 0$$

$$Q'[k(x-u) = 0] = \text{maximum}$$

$$Q'[k(x-u) \rightarrow -\infty] = 0$$

ME12-6, B4_49_2

double line element of Richter (1987) for the lighting technic with luminance $L = \bar{F}(P, D, T)$

luminance signal function $F(L)$

$$F(L) = iQ(H) = \begin{cases} \frac{i}{\pi} Q(\frac{H}{\pi}) & (x < u) \\ \frac{i}{\pi} Q(\frac{\bar{H}}{\pi}) & (x \geq u) \end{cases}$$

with: $k=1,4$ $\bar{k}=1$ $i=1$ $\bar{i}=-2$

$$x = \log L \quad u = \log L_u$$

$$H = e^{k(x-u)}, \bar{H} = e^{\bar{k}(x-u)}$$

ME12-7, B4_50_1

double line element of Richter (1987) for the lighting technic with luminance $L = \bar{F}(P, D, T)$

luminance signal function $F(L)$

$$F(L) = iQ(H) \quad H = e^{k(x-u)}$$

$$Q[\ln(1+1/(1+\sqrt{2}H))] / \ln \sqrt{2} - 1$$

Taylor-derivations:

$$\Delta F(L) = \frac{dF}{dL} \Delta L = i \frac{dQ}{dH} \Delta H$$

$$= -i\sqrt{2}\Delta H / [\ln 2(1+\sqrt{2}H)(2+\sqrt{2}H)]$$

ME12-8, B4_50_2

$F(x)$ „impulse rate = impulses / s“
threshold process W
 $-2Q[1,0(x-u)]$

N white scaling W

scaling

NW black scaling W

W no scaling

$L_u = 100 \text{ cd/m}^2$

$x = \log L$

ME12-1, B4_52_1

$dF(x)/dx$ „impulse rate change“
white scaling W
 $d[-2Q[1,0(x-u)]]/dx$

sum for: scaling process

W white scaling W

N black scaling W

W no scaling

$L_u = 100 \text{ cd/m}^2$

$x = \log L$

ME12-1, B4_52_2

$F(x)$ „color signal = impulses / s“
W-process: red R
green G

N-process: red r
green g

W-process: mean RG

N-process: mean rg

$x = \log L$

ME12-3, B4_53_1

color signal: amplitude modulation
W-process: U
N-process: u

W-process: $U + (R - G)$

$U - (R - G)$

N-process: $u + (r - g)$

$u - (r - g)$

$x = \log L$

ME12-4, B4_53_2

achromatic- and RG -opponent signals
 $-2Q[1,0(x-u+p)]$

W process

N process

$p = 1, 0, -1$

$L_u = 100 \text{ cd/m}^2$

$x = \log L$

ME12-5, B4_54_1

chromatic signal RG : light and dark
 $-2Q[1,0(x-u+p)]$

W process

N process

$p = 1, 0, -1$

$L_u = 100 \text{ cd/m}^2$

$x = \log L$

ME12-6, B4_54_2

achromatic ± RG -chromatic signals
 $-2Q[1,0(x-u+p)]$

W process

N process

$p = 1, 0, -1$

$L_u = 100 \text{ cd/m}^2$

$x = \log L$

ME12-7, B4_55_1

achromatic- and RG -opponent signals
 $-2Q[1,0(x-u+p)]$

W process

N process

$p = 1, 0, -1$

$L_u = 100 \text{ cd/m}^2$

$x = \log L$

ME12-8, B4_55_2

See original or copy: <http://www.me.com/klaus.richter/ME12/ME12L0N1.TXT/.PS>
Technical information: <http://www.ps.bam.de> or <http://130.149.60.45/~farbm>