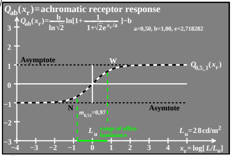
http://farbe.li.tu-berlin.de/eeo3/eeo3l0n1.txt /.ps; only vector graphic VG; start output
see similar files: http://farbe.li.tu-berlin.de/eeo3/eeo3.htm



eeo30−1n

Achromatic receptor-response function
$Q_{ab}[x_r/a]$ for a=0,5 and b=1,0

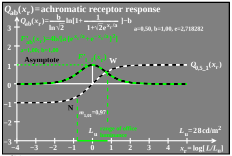
with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$$Q_{ab}[x_r/a] = \frac{b}{\ln\sqrt{2}} \ln\left[\frac{1}{1+\sqrt{2}\,e^{(x_r/a)}}\right] - b$$

function values for b=1 and any a>0 :

$Q_{a1}[x_r/a \rightarrow -\infty]$	$= -1$	$x=\log L$, $u=\log L_u$
$Q_{a1}[x_r/a = 0]$	$= 0$	$x_r=\log[L/L_u]$
$Q_{a1}[x_r/a \rightarrow +\infty]$	$= +1$	$= x - u$

eeo30−2n



eeo31−1n

Mathematical equations of hyperbel functions
See: Papula, L., (2003), Mathematische Formelsammlung, Vieweg

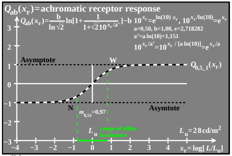
$$F(x) = \tanh(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}} = \frac{u(x)}{v(x)} \quad u'(x)=v(x),\ v'(x)=u(x) \quad [1]$$

$$F'(x) = \frac{u'(x)\,v(x) - u(x)\,v'(x)}{v^2(x)} = \frac{v^2(x) - u^2(x)}{v^2(x)} \quad [2]$$

$$F'(x) = \frac{[e^x+e^{-x}][e^x+e^{-x}] - [e^x-e^{-x}][e^x-e^{-x}]}{[e^x+e^{-x}]^2} \quad [3]$$

$$F'(x) = \frac{4}{[e^x+e^{-x}]^2} = \frac{1}{\cosh^2(x)} \quad [4]$$

eeo31−2n



eeo30−3n

Achromatic receptor-response function
$Q_{ab}[x_r/a]$ for a=0,5 and b=1,0

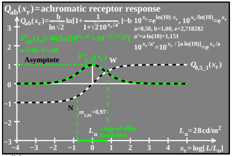
with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$$Q_{ab}[x_r/a] = \frac{b}{\ln\sqrt{2}} \ln\left[\frac{1}{1+\sqrt{2}\,e^{(x_r/a)}}\right] - b$$

function values for b=1 and any a>0 :

$Q_{a1}[x_r/a \rightarrow -\infty]$	$= -1$	$x=\log L$, $u=\log L_u$
$Q_{a1}[x_r/a = 0]$	$= 0$	$x_r=\log[L/L_u]$
$Q_{a1}[x_r/a \rightarrow +\infty]$	$= +1$	$= x - u$

eeo30−4n



eeo31−3n

Mathematical equations of hyperbel functions
See: Papula, L., (2003), Mathematische Formelsammlung, Vieweg

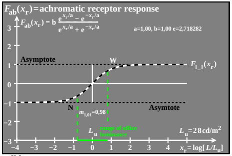
$$F(x/a) = \tanh(x/a) = \frac{e^{x/a} - e^{-x/a}}{e^{x/a} + e^{-x/a}} = \frac{u(x/a)}{v(x/a)} \quad [1]$$

$$F'(x/a) = \frac{u'(x/a)v(x/a) - u(x/a)v'(x/a)}{v^2(x/a)} \quad [2]$$

$$F'(x/a) = \frac{v^2(x/a) - u^2(x/a)}{a\,v^2(x/a)} \quad [3]$$

$$F'(x/a) = \frac{4}{a\,[e^{x/a}+e^{-x/a}]^2} = \frac{1}{a\cosh^2(x/a)} \quad [4]$$

eeo31−4n



eeo30−5n

Mathematical equations of hyperbel functions
See: Papula, L., (2003), Mathematische Formelsammlung, Vieweg

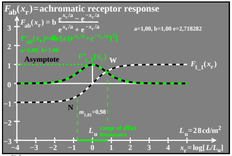
$$\sinh(x) = \frac{e^x - e^{-x}}{2} \ [1], \quad \cosh(x) = \frac{e^x + e^{-x}}{2} \ [2]$$

$$\tanh(x) = \frac{\sinh(x)}{\cosh(x)} = \frac{e^x - e^{-x}}{e^x + e^{-x}} \quad [3]$$

$$\tanh(x/2) = \frac{\sinh(x)}{\cosh(x)+1} = \frac{\cosh(x)+1}{\sinh(x)} = \frac{e^{x/2}-e^{-x/2}}{e^{x/2}+e^{-x/2}} \quad [4]$$

$$\sinh^2(x) + \cosh^2(x) = 1 \quad [5]$$

eeo30−6n



eeo31−5n

Mathematical equations of hyperbel functions
See: Papula, L., (2003), Mathematische Formelsammlung, Vieweg

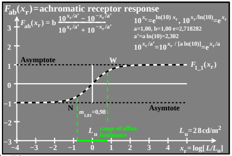
$$F_{1b}(x) = b\tanh(x) = b\frac{e^x - e^{-x}}{e^x + e^{-x}} = b\frac{u(x)}{v(x)} \quad [1]$$

$$F'_{1b}(x) = b\frac{u'(x)\,v(x) - u(x)\,v'(x)}{v^2(x)} \quad [2]$$

$$F'_{1b}(x) = b\frac{v^2(x) - u^2(x)}{a\,v^2(x)} \quad [3]$$

$$F'_{1b}(x) = \frac{4b}{[e^x+e^{-x}]^2} = \frac{b}{\cosh^2(x)} \quad [4]$$

eeo31−6n



eeo30−7n

Mathematical equations of hyperbel functions
See: Papula, L., (2003), Mathematische Formelsammlung, Vieweg

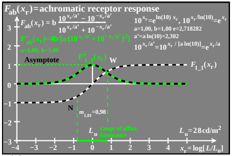
$$\sinh(x) = \frac{10^{x_r/a'} - 10^{-x_r/a'}}{2} \ [1], \quad \cosh(x) = \frac{10^{x_r/a'} + 10^{-x_r/a'}}{2} \ [2]$$

$$\tanh(x) = \frac{\sinh(x)}{\cosh(x)} = \frac{10^{x_r/a'} - 10^{-x_r/a'}}{10^{x_r/a'} + 10^{-x_r/a'}} \quad [3]$$

$$\tanh(x/2) = \frac{\sinh(x)}{\cosh(x)+1} = \frac{\cosh(x)+1}{\sinh(x)} = \frac{10^{x_r/2a'} - 10^{-x_r/2a'}}{10^{x_r/2a'} + 10^{-x_r/2a'}} \quad [4]$$

$$\sinh^2(x) + \cosh^2(x) = 1 \quad [5]$$

eeo30−8n



eeo31−7n

Mathematical equations of hyperbel functions
See: Papula, L., (2003), Mathematische Formelsammlung, Vieweg

$$F_{ab}(x/a) = b\tanh(x/a) = b\frac{e^{x/a} - e^{-x/a}}{e^{x/a} + e^{-x/a}} = b\frac{u(x/a)}{v(x/a)} \quad [1]$$

$$F'_{ab}(x/a) = b\frac{u'(x/a)\,v(x/a) - u(x/a)\,v'(x/a)}{v^2(x/a)} \quad [2]$$

$$F'_{ab}(x/a) = b\frac{v^2(x/a) - u^2(x/a)}{a\,v^2(x/a)} \quad [3]$$

$$F'_{ab}(x/a) = \frac{4b}{a\,[e^{x/a}+e^{-x/a}]^2} = \frac{b}{a\cosh^2(x/a)} \quad [4]$$

eeo31−8n

TUB-test chart eeo3; Model of two normalized response functions $F_{ab}(x_r)$ & $Q_{ab}(x_r)$ and derivation
Tangens hyperbolicus $\tanh(x_r)$ and modified functions with e^{x_r} and 10^{x_r}; $a^n = a^{1,0}$

see similar files of the whole serie: http://farbe.li.tu-berlin.de/eeos.htm
technical information: http://farbe.li.tu-berlin.de or http://color.li.tu-berlin.de

TUB registration: 20230701-eeo3/eeo3l0n1.txt /.ps
application for evaluation and measurement of display or print output

TUB material: code=rha4ta