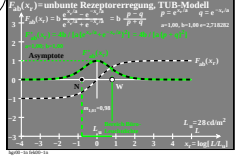

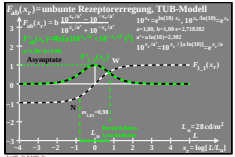

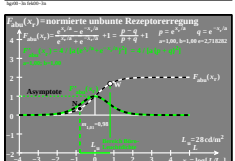

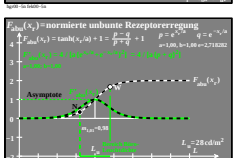

Mathematikgleichungen der Hyperbeltunen
Siehe: *Handbook of mathematical functions, NBS, USA, Sec. 4.5*

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

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

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

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

Mathematikgleichungen der Hyperbeltunen
Siehe: *Handbook of mathematical functions, NBS, USA, Sec. 4.5*

$F_{abu}(x/a) = [\tanh(x/a)+1] \,/\, [\tanh(x_u/a)+1]$ [1u]

$F'_{abu}(x/a) = \tanh(x/a)$ mit $\tanh(x_u/a)=0$ [2u]

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

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

hgr01-1a bild01-1a
hgr01-2a bild01-2a

Mathematikgleichungen der Hyperbeltunen
Siehe: *Handbook of mathematical functions, NBS, USA, Sec. 4.5*

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

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

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

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

Mathematikgleichungen der Hyperbeltunen
Siehe: *Handbook of mathematical functions, NBS, USA, Sec. 4.5*

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

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

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

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

hgr01-3a bild01-3a
hgr01-4a bild01-4a

Mathematikgleichungen der Hyperbeltunen
Siehe: *Handbook of mathematical functions, NBS, USA, Sec. 4.5*

$F_{ab}(x/a) = b\,\tanh(x/a) = b\,\frac{e^{x/a}-e^{-x/a}}{e^{x/a}+e^{-x/a}} = \frac{b}{\cosh^2(x/a)}$ [1]

$\frac{dF_{ab}(x/a)}{dx} = \frac{4b}{a[e^{x/a}+e^{-x/a}]^2} = \frac{b}{a\,\cosh^2(x/a)}$ [4]

$\frac{dF_{ab}(x/a)}{d\,x_t} = \frac{4b}{a[e^{x_t/a}+e^{-x_t/a}]^2}$ $x_t = \log(L/L_{tu})$ [5]

$\frac{dF_{ab}(x/a)}{d\,x_t} = \frac{dF_{ab}(x/a)}{dL}\frac{dx_t}{dL} = \frac{4b}{a[e^{x_t/a}+e^{-x_t/a}]^2}\frac{1}{L} = \frac{\ln(10)}{L}$ [6]

Mathematikgleichungen der Hyperbeltunen
Siehe: *Handbook of mathematical functions, NBS, USA, Sec. 4.5*

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

$\frac{dF_{abu}(x/a)}{dx} = \frac{4}{a[e^{x/a}+e^{-x/a}]^2} = \frac{1}{a\,\cosh^2(x/a)}$ [4u]

$\frac{dF_{abu}(x/a)}{d\,x_t} = \frac{4}{a[e^{x/a}+e^{-x/a}]^2}$ $x_t = \log(L/L_{tu})$ [5u]

$\frac{dF_{abu}(x/a)}{d\,x_t} = \frac{dF_{abu}(x/a)}{dL}\frac{dx_t}{dL} = \frac{4}{a[e^{x_t/a}+e^{-x_t/a}]^2}\frac{1}{L} = \frac{\ln(10)}{L}$ [6u]

hgr01-5a bild01-5a
hgr01-6a bild01-6a

Mathematikgleichungen der Hyperbeltunen
Siehe: *Handbook of mathematical functions, NBS, USA, Sec. 4.5*

$F_{ab}(x_t/a) = b\,\tanh(x_t/a) = b\,\frac{e^{x_t/a}-e^{-x_t/a}}{e^{x_t/a}+e^{-x_t/a}}$ [1]

$\frac{dF_{ab}(x_t/a)}{d\,x_t} = \frac{4b}{a[e^{x_t/a}+e^{-x_t/a}]^2}$ $x_t = \log(L/L_{tu})$ [5]

$\frac{dF_{ab}(x_t/a)}{d\,x_t} = \frac{dF_{ab}(x_t/a)}{dL}\frac{dx_t}{dL} = \frac{4b}{a[e^{x_t/a}+e^{-x_t/a}]^2}\frac{1}{L} = \frac{\ln(10)}{L}$ [6]

$\frac{L}{dL} = \frac{4b\ln(10)}{a[e^{x_t/a}+e^{-x_t/a}]^2}$ $dL = \frac{a[e^{x_t/a}+e^{-x_t/a}]^2 L}{4b\ln(10)}$ [7]

Mathematikgleichungen der Hyperbeltunen
Siehe: *Handbook of mathematical functions, NBS, USA, Sec. 4.5*

$F_{abu}(x_t/a) = \tanh(x_t/a) = \frac{e^{x_t/a}-e^{-x_t/a}}{e^{x_t/a}+e^{-x_t/a}}$ [1u]

$\frac{dF_{abu}(x_t/a)}{d\,x_t} = \frac{4}{a[e^{x_t/a}+e^{-x_t/a}]^2}$ $x_t = \log(L/L_{tu})$ [5u]

$\frac{dF_{abu}(x_t/a)}{d\,x_t} = \frac{dF_{abu}(x_t/a)}{dL}\frac{dx_t}{dL} = \frac{4}{a[e^{x_t/a}+e^{-x_t/a}]^2}\frac{1}{L} = \frac{\ln(10)}{L}$ [6u]

$\frac{L}{dL} = \frac{4\ln(10)}{a[e^{x_t/a}+e^{-x_t/a}]^2}$ $dL = \frac{a[e^{x_t/a}+e^{-x_t/a}]^2 L}{4\ln(10)}$ [7u]

hgr01-7a bild01-7a
hgr01-8a bild01-8a

TUB-Prüfvorlage hgr0; Modell für normierte Erregungsfunktion $F_{ab}(x_t)$ und Ableitung $F'_{ab}(x_t)$
Mathematische Berechnung der Ableitung $F'_{ab}(x_t)$, des Kontrastes $L/\Delta L$ und der Unterscheidung ΔL