Colour thresholds and potential functions with four constants A_i

nonlinear color terms	name and relationship with tristimulues values *XYZ* , and the chromatic values *(A, B)*	notes
Threshold space *ABY−JND6* equation (6)	$T^* = A_1 \cdot [\, (A_3 + A_4 \cdot Y)^g - 1\,]$ $(g = A_2)$ $dT^* / dY = g \cdot A_1 \cdot A_4 \cdot (A_3 + A_4 \cdot Y)^{g-1}$ $dY = 1 / [g \cdot A_1 \cdot A_4 \cdot (A_3 + A_4 \cdot Y)^{g-1}]$ $Y / dY = Y / [g \cdot A_1 \cdot A_4 \cdot (A_3 + A_4 \cdot Y)^{g-1}]$ ***necessary for least square fit of data:*** $dT^* / dA_1 = (A_3 + A_4 \cdot Y)^g - 1$ $(g = A_2)$ $dT^* / dg = A_1 \cdot (A_3 + A_4 \cdot Y)^g \cdot ln(A_3 + A_4 \cdot Y)$ $dT^* / dA_3 = g \cdot A_1 \cdot (A_3 + A_4 \cdot Y)^{g-1}$ $dT^* / dA_4 = g \cdot A_1 \cdot (A_3 + A_4 \cdot Y)^{g-1} \cdot Y$	$L/dL =$ $=(x/y - x_n/y_n) \cdot Y$ Normalization similar to CIELAB: $X_{01} = X/X_n$; $Y_{01} = Y/Y_n$; $Z_{01} = Z/Z_n$ Relation for complementary (c) colours: $X_{01c}=1-X_{01}$; $Y_{01c}=1-Y_{01}$; $Z_{01c}=1-Z_{01}$ Chromatic values: $A_{01}=(a_{01}-a_{01n}) \cdot Y_{01}$ $=(x_{01} / y_{01} - 1) \cdot Y_{01}$ $=(X_{01} / Y_{01} - 1) \cdot Y_{01}$ $=X_{01} - Y_{01} = -A_{01c}$
Properties complementary colours	$A_{01c}=-A_{01}$; $B_{01c}=-B_{01}$; $C_{ab,01c}=C_{ab,01}$; $\Delta A_{01c}=\Delta A_{01}$; $\Delta B_{01c}=\Delta B_{01}$; $\Delta C_{ab,01c}=\Delta C_{ab,01}$;	$\Delta Y/Y$=const

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Colour thresholds and potential functions with three constants A_i

nonlinear color terms	name and relationship of tristimulues value difference threshold *dY* and tristimulues value *Y*	notes
Threshold space *ABY−JND7* equation (7) logarithmic approximation ***F = log(dY)***	$x = A_3 + A_1 \cdot Y^g$ $(g = A_2)$ $F = log(x)$ $dF / dx = 1. / [\, x \cdot log(10.)\,]$ ***necessary for least square fit of data:*** $dx / dA_1 = Y^g$ $dx / dg = A_1 \cdot Y^g \cdot ln(Y)$ $(g = A_2)$ $dx / dA_3 = 1$ $dx / dY = A_1 \cdot g \cdot Y^{g-1}$	$L/dL =$ $=(x/y - x_n/y_n) \cdot Y$ Normalization similar to CIELAB: $X_{01} = X/X_n$; $Y_{01} = Y/Y_n$; $Z_{01} = Z/Z_n$ Relation for complementary (c) colours: $X_{01c}=1-X_{01}$; $Y_{01c}=1-Y_{01}$; $Z_{01c}=1-Z_{01}$
	$dF / dY = dF / dx \cdot [dx / dY]$ $= [A_1 \cdot g \cdot Y^{g-1}] / [\, x \cdot log(10.)\,]$ **for dT^* = 1:** $dY = [\, x \cdot log(10.)\,] / [A_1 \cdot g \cdot Y^{g-1}]$ $Y / dY = [A_1 \cdot g \cdot Y^g] / [\, x \cdot log(10.)\,]$	Chromatic values: $A_{01}=(a_{01}-a_{01n}) \cdot Y_{01}$ $=(x_{01} / y_{01} - 1) \cdot Y_{01}$ $=(X_{01} / Y_{01} - 1) \cdot Y_{01}$ $=X_{01} - Y_{01} = -A_{01c}$

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Colour thresholds and potential functions with three constants A_i

nonlinear color terms	name and relationship of tristimulues value difference threshold *dY* and tristimulues value *Y*	notes
Threshold space *ABY−JND7* equation (7) logarithmic approximation ***F = log(dY)***	$x = A_3 + A_1 \cdot Y^g$ $(g = A_2)$ $F = log(x)$ $dF / dx = 1. / [\, x \cdot log(10.)\,]$ ***necessary for least square fit of data:*** $dx / dA_1 = Y^g$ $dx / dg = A_1 \cdot Y^g \cdot ln(Y)$ $(g = A_2)$ $dx / dA_3 = 1$ $dx / dY = A_1 \cdot g \cdot Y^{g-1}$	..
	$dF / dY = dF / dx \cdot [dx / dY]$ $= [A_1 \cdot g \cdot Y^{g-1}] / [\, x \cdot log(10.)\,]$ **for *dF* = 1:** $dY = [\, x \cdot log(10.)\,] / [A_1 \cdot g \cdot Y^{g-1}]$ $Y / dY = [A_1 \cdot g \cdot Y^g] / [\, x \cdot log(10.)\,]$	

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Colour thresholds and potential functions with three constants A_i

nonlinear color terms	name and relationship of tristimulues value difference threshold *dY* and tristimulues value *Y*	notes
Threshold space *ABY−JND9* equation (9) logarithmic approximation ***F = log(dY)***	$x = [\, A_1 + A_3 \cdot Y\,]^g$ $(g = A_2)$ $F = log(x)$ $dF / dx = 1. / [\, x \cdot log(10)\,]$ *necessary for least square fit of data:* $dx / dA_1 = g \cdot [A_1 + A_3 \cdot Y]^{g-1}$ $dx / dg = [A_1 + A_3 Y]^g \cdot ln[A_1 + A_3 Y]$ $dx / dA_3 = g \cdot Y \cdot [A_1 + A_3 \cdot Y]^{g-1}$ $dx / dY = g \cdot A_3 \cdot [A_1 + A_3 \cdot Y]^{g-1}$	$A_1 + A_3 Y$ **= 1** $- s + s\, Y/Y_s$ *this equation defines:* $s = 1 - A_1$ $Y_s = (\,1 - A_1/A_3)$ $g = A_2 = -1{,}25$ $1/[(1-g)V]\,[L_s/s]^g = 1$ $V=1/[0{,}036(1-g)L_u^{-0.30}]$ $L_s=0{,}25\, L_u^{0.705}$ $L_u=0{,}1 ... 1000$ cd/m^2
	$dF / dY = dF / dx \cdot [dx / dY]$ $= \{g \cdot A_3 \cdot [A_1+A_3 Y]^{g-1}\}/[x \cdot log(10)] = g \cdot A_3 \cdot [A_1+A_3 Y]^{-1}/log(10)$ **for *dF* = 1** (*dY* is logarithmic) : $dY = [x \cdot log(10)\,]/\{g \cdot A_3 \cdot [A_1+A_3 Y]^{g-1}\}=log(10)[A_1+A_3 Y]/\{g A_3\}$ $Y/dY=\{g A_3 Y[A_1+A_3 Y]^{g-1}\}/[x log(10)]=\{g A_3 Y\}/\{log(10)[A_1+A_3 Y]\}$	

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see similar files: http://130.149.60.45/~farbmetrik/UE12/UE12.HTM
technical information: http://www.ps.bam.de or http://130.149.60.45/~farbmetrik

TUB registration: 20130201-UE12/UE12L0N1.TXT /.PS
application for measurement of display output

TUB material: code=rha4ta