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TUB registration: 20201101-AESO/AES0L0NP.PDF /.PS TUB material: code=rh4ta
 application for evaluation and measurement of display or print output

colour valence metric (color data: linear relation to CIE 1931 data)

linear color terms	name and relationship to CIE tristimulus or chromaticity values	notes
tristimulus values	X, Y, Z	
chromatic value	<i>linear chromatic value diagram</i> (A_1, B_1)	For grey Z of D65
red-green	$A_1 = n_{1A} [X/X_Z - Y/Y_Z] = n_{1A} [a_1 - a_{z1}] Y$	$X_Z = 95,05 \cdot 0,18$ $Y_Z = 100,00 \cdot 0,18$
yellow-blue	$B_1 = n_{1B} [Z/Z_Z - Y/Y_Z] = n_{1B} [b_1 - b_{z1}] Y$	$Z_Z = 108,90 \cdot 0,18$ If contrast 25:1 = 90:3,6, then $-50 \leq B_1 \leq 50$
radial	$C_{AB,1} = [A_1^2 + B_1^2]^{1/2}$	$n_{1A} = 25, n_{1B} = -10$ (background)
chromaticity	<i>linear chromaticity diagram</i> (a_1, b_1)	
red-green	$a_1 = [X/Y] / X_Z = [x/y] / X_Z$	
yellow-blue	$b_1 = [Z/Y] / Z_Z = [z/y] / Z_Z$	
radial	$c_{AB,1} = [(a_1 - a_{z1})^2 + (b_1 - b_{z1})^2]^{1/2}$	

AES00-3N

higher colour metric (color data: nonlinear relation to CIE 1931 data)

nonlinear color terms	name and relationship with tristimulus or chromaticity values	notes
lightness	$L^*_1 = k \log [Y / Y_Z]$ ($L^*_1 = 0$ for $Y = Y_Z$) If contrast = 25:1 = 90:3,6, then $-40 \leq L^*_1 \leq 40$	LABJND 2019 $k = 40 / \log(5) = 57$
chroma	<i>logarithmic transform of tristimulus values XYZ.</i>	For grey Z of D65
red-green	$A^*_1 = n_{A^*} [\log (X / X_Z) - \log (Y / Y_Z)]$	$X_Z = 95,05 \cdot 0,18$ $Y_Z = 100,00 \cdot 0,18$
yellow-blue	$B^*_1 = n_{B^*} [\log (Y / Y_Z) - \log (Z / Z_Z)]$	$Z_Z = 108,90 \cdot 0,18$ If contrast = 25:1 = 90:3,6, then $-28 \leq B^*_1 \leq 28$
radial	$C^*_{AB,1} = [A^{*2}_1 + B^{*2}_1]^{1/2}$	$n_{A^*} = 100, n_{B^*} = -40$ (background)
chromaticity	<i>nonlinear chromaticities, if XYZ are normalized to 100.</i>	compare to log cone excitation
red-green	$a^*_1 = \log [X / Y] = \log [x / y]$	$\log [L / L_Z]$
yellow-blue	$b^*_1 = \log [Z / Y] = \log [z / y]$	$\log [M / (M_Z)]$
radial	$c^*_{AB,1} = [(a^*_1 - a^*_{z1})^2 + (b^*_1 - b^*_{z1})^2]^{1/2}$	$\log [S / (S_Z)]$

AES01-3N

colour valence metric (color data: linear relation to CIE 1931 data)

linear color terms	name and relationship to CIE tristimulus or chromaticity values	notes
tristimulus values	X, Y, Z	
chromatic value	<i>linear chromatic value diagram</i> (A, B)	for n=D65
red-green	$A = n_A [X/Y - X_n/Y_n] Y = n_A [a - a_n] Y$ $= n_A [x/y - x_n/y_n] Y$	$X_n = 95,05$ $Y_n = 100,00$
yellow-blue	$B = -0,4 n_B [Z/Y - Z_n/Y_n] Y = n_B [b - b_n] Y$ $= -0,4 n_B [z/y - z_n/y_n] Y$	$X_n = 108,90$ $n_A = n_B = 2,5$
radial	$C_{AB} = [A^2 + B^2]^{1/2}$	(background)
chromaticity	<i>linear chromaticity diagram</i> (a, b)	compare to linear cone excitation
red-green	$a = X / Y = x / y$	$L/(L+M)$
yellow-blue	$b = -0,4 [Z / Y] = -0,4 [z / y]$	$S/(L+M)$
radial	$c_{ab} = [(a - a_n)^2 + (b - b_n)^2]^{1/2}$	

AES00-7N

higher colour metric (color data: nonlinear relation to CIE 1931 data)

nonlinear color terms	name and relationship with tristimulus or chromaticity values	notes
lightness	$L^* = 116 (Y / 100)^{1/3} - 16$ ($Y > 0,8$) approximation: $L^* = 100 (Y/100)^{1/2,4}$ ($Y > 0$)	CIELAB 1976
chroma	<i>nonlinear transform chromatic values A, B</i>	CIELAB 1976
red-green	$a^* = 500 [(X/X_n)^{1/3} - (Y/Y_n)^{1/3}]$ $= 500 (a' - a'_n) Y^{1/3}$	CIELAB 1976
yellow-blue	$b^* = 200 [(Y/Y_n)^{1/3} - (Z/Z_n)^{1/3}]$ $= 500 (b' - b'_n) Y^{1/3}$	CIELAB 1976 $n=D65$
radial	$C^*_{ab} = [a^{*2} + b^{*2}]^{1/2}$	(background)
chromaticity	<i>nonlinear transform chromaticities x/y, z/y</i>	compare to log cone excitation
red-green	$a' = (1 / X_n)^{1/3} (x / y)^{1/3}$ $= 0,2191 (x / y)^{1/3}$ for D65	$\log [L / (L+M)]$
yellow-blue	$b' = -0,4 (1 / Z_n)^{1/3} (z / y)^{1/3}$ $= -0,08376 (z / y)^{1/3}$ for D65	$\log [S / (L+M)]$
radial	$c^*_{ab} = [(a' - a'_n)^2 + (b' - b'_n)^2]^{1/2}$	

AES01-7N