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

linear color terms	name and relationship to CIE tristimulues or chromaticity values	notes:
luminous value	$Y = y\ (X + Y + Z)$	
saturation value	*for linear saturation value diagram (S*a, S*b)*	
red−green	$S_a = A / Y = X / Y - X_n / Y_n$	*n=D65 (backgr.)*
	$= x / y - x_n / y_n = a - a_n$	
yellow−blue	$S_b = B / Y = -0{,}4\ [\ Z / Y - Z_n / Y_n\ ]$	
	$= -0{,}4\ [\ z / y - z_n / y_n\ ] = b - b_n$	
radial	$S_{ab} = [\ (a - a_n)^2 + (b - b_n)^2\ ]^{1/2}$	
chromaticity	*for (linear) chromaticity diagram (a, b)*	*compare to linear*
red−green	$a = X / Y = x / y$	*cone excitation*
yellow−blue	$b = -0{,}4\ [Z / Y] = -0{,}4\ [z / y]$	***L/ (L+M)***
radial	$c_{ab} = [\ (a - a_n)^2 + (b - b_n)^2\ ]^{1/2}$	***S/ (L+M)***

VE790−3

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

linear color terms	name and relationship to CIE tristimulues or chromaticity values	notes:
luminous value	$Y = y\ (X + Y + Z)$	
chromatic value	*for linear chromatic value diagram (A, B)*	
red−green	$A = [\ X / Y - X_n / Y_n\ ]\ Y = [\ a - a_n\ ]\ Y$	*n=D65 (backgr.)*
	$= [\ x / y - x_n / y_n\ ]\ Y$	
yellow−blue	$B = -0{,}4\ [\ Z / Y - Z_n / Y_n\ ]\ Y = [\ b - b_n\ ]\ Y$	
	$= -0{,}4\ [\ z / y - z_n / y_n\ ]\ Y$	
radial	$C_{ab} = [\ A^2 + B^2\ ]^{1/2}$	
chromaticity	*for (linear) chromaticity diagram (a, b)*	*compare to linear*
red−green	$a = X / Y = x / y$	*cone excitation*
yellow−blue	$b = -0{,}4\ [Z / Y] = -0{,}4\ [z / y]$	***L/ (L+M)***
radial	$c_{ab} = [\ (a - a_n)^2 + (b - b_n)^2\ ]^{1/2}$	***S/ (L+M)***

VE790−7

Higher colormetric (color data: nonlinear relation to CIE 1931 data)

non linear color terms	name and relationship with tristimulues or chromaticity values	notes:
lightness	$L^* = 116\ (Y / 100)^{1/3} - 16$ $(Y > 0{,}8)$	*CIELAB 1976*
	Approximation: $L^* = 100\ (Y / 100)^{1/3}$	
saturation	**= chroma / lightness**	
red−green	$S^*_a = a^* / [\ 100\ (Y / 100)^{1/3}\ ]$	
	$= 21{,}6\ (a' - a'_n)$	*n=D65 (backgr.)*
yellow−blue	$S^*_b = b^* / [\ 100\ (Y / 100)^{1/3}\ ]$	
	$= 21{,}6\ (b' - b'_n)$	
radial	$S^*_c = 21{,}6\ [\ (a' - a'_n)^2 + (b' - b'_n)^2\ ]^{1/2}$	
excitation ?	*nonlinear transform of chromaticities a=x/y and b=z/y*	
red−green	$a' = (1 / X_n)^{1/3}\ (x / y)^{1/3}$	*compare to log*
	$= 0{,}2191\ (x / y)^{1/3}$ for *D65*	*cone excitation*
yellow−blue	$b' = -0{,}4\ (1 / Z_n)^{1/3}\ (z / y)^{1/3}$	***log[L/ (L+M)]***
	$= -0{,}08376\ (z / y)^{1/3}$ for *D65*	***log[S/ (L+M)]***
radial	$c'_{ab} = [\ (a' - a'_n)^2 + (b' - b'_n)^2\ ]^{1/2}$	

VE791−3

Higher colormetric (color data: nonlinear relation to CIE 1931 data)

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

VE791−7