

Equations: colorimetric data transfer from LCH^* (CIELAB) to nce^* and rgb^*_3

Given: CIELAB data of any colour L^* , C^*_{ab} , $h_{ab} = LCH^*$ or L^* , a^* , b^*

CIELAB data L^*_X , $C^*_{ab,X}$, $h_{ab,X}$, a^*_X , b^*_X of eight basic colours $X = RJGC^*BM^*NW$

Aim: nce^* and rgb^*_3 elementary colour data of the given colour (in example M located between R and J)

CIELAB hue angle of maximum colour M	$h_{ab,M} = h_{ab}$	(0 ≤ h_{ab} ≤ 360)	(1)
Relative device hue angle ratio of M	$\alpha_M = [h_{ab,M} - h_{ab,R}] / [h_{ab,J} - h_{ab,R}]$		(2)
CIELAB data L^*_M , a^*_M , b^*_M , $C^*_{ab,M}$ of M	$L^*_M = \alpha_M L^*_J + (1 - \alpha_M) L^*_R$		(3)
	$a^*_M = \alpha_M a^*_J + (1 - \alpha_M) a^*_R$		(4)
	$b^*_M = \alpha_M b^*_J + (1 - \alpha_M) b^*_R$		(5)
	$C^*_{ab,M} = [\alpha_M^2 L^{*2}_J + (1 - \alpha_M)^2 L^{*2}_R]^{1/2}$		(6)
relative lightness of the given colour	$l^* = [L^* - L^*_N] / [L^*_W - L^*_N]$		(7)
relative chroma of the given colour	$c^* = C^*_{ab} / C^*_{ab,M}$		(8)
relative triangle lightness of the given colour	$t^* = l^* - [L^*_M - L^*_N] / [L^*_W - L^*_N] c^* + 0,5 c^*$		(9)
relative blackness of the given colour	$n^* = 1 - t^* - 0,5 c^*$		(10)
relative whiteness of the given colour	$w^* = 1 - n^* - c^*$		(11)
elementary hue angle of the given colour	$e^* = \text{function} [h_{ab}]$	(with table or equation)	(12)
relative rgb^*_3 data of M	$r^*_{3,M} = \alpha_M r^*_{3,J} + (1 - \alpha_M) r^*_{3,R}$		(13)
	$g^*_{3,M} = \alpha_M g^*_{3,J} + (1 - \alpha_M) g^*_{3,R}$		(14)
	$b^*_{3,M} = \alpha_M b^*_{3,J} + (1 - \alpha_M) b^*_{3,R}$		(15)
relative rgb^*_3 data of the given colour	$r^*_3 = w^* + c^* r^*_{3,M}$		(16)
	$g^*_3 = w^* + c^* g^*_{3,M}$		(17)
	$b^*_3 = w^* + c^* b^*_{3,M}$		(18)

ZE180-3

Equations: colorimetric data transfer from LCH^* (CIELAB) to nce^* and rgb^*_3

Given: CIELAB data of any colour L^* , C^*_{ab} , $h_{ab} = LCH^*$ or L^* , a^* , b^*

CIELAB data L^*_X , $C^*_{ab,X}$, $h_{ab,X}$, a^*_X , b^*_X of eight basic colours $X = RJGC^*BM^*NW$

Aim: nce^* and rgb^*_3 elementary colour data of the given colour

hue angle of the given colour and of M	$h_{ab} = H^*$		(1)
LCH^*_M data of maximum colour M	$L^*_M = \text{function} [h_{ab}]$	(with table or equation)	(2)
	$C^*_{ab,M} = \text{function} [h_{ab}]$	(with table or equation)	(3)
	$H^*_M = h_{ab}$		(4)
relative CIELAB lightness of the given colour	$l^* = [L^* - L^*_N] / [L^*_W - L^*_N]$		(5)
relative chroma of the given colour	$c^* = C^*_{ab} / C^*_{ab,M}$		(6)
relative triangle lightness of the given colour	$t^* = l^* - [L^*_M - L^*_N] / [L^*_W - L^*_N] c^* + 0,5 c^*$		(7)
relative blackness of the given colour	$n^* = 1 - t^* - 0,5 c^*$		(8)
relative whiteness of the given colour	$w^* = 1 - n^* - c^*$		(9)
elementary hue angle of the given colour	$e^* = \text{function} [h_{ab}]$	(with table or equation)	(10)
rgb^*_3 data of maximum colour M	$r^*_{3,M} = \text{function} [h_{ab}]$	(with table or equation)	(11)
	$g^*_{3,M} = \text{function} [h_{ab}]$	(with table or equation)	(12)
	$b^*_{3,M} = \text{function} [h_{ab}]$	(with table or equation)	(13)
relative rgb^*_3 data of the given colour	$r^*_3 = w^* + c^* r^*_{3,M}$		(14)
	$g^*_3 = w^* + c^* g^*_{3,M}$		(15)
	$b^*_3 = w^* + c^* b^*_{3,M}$		(16)

ZE180-7

Equations: colorimetric data transfer from nce^* to elementary colour data rgb^*_3 and LCH^*

Given: nce^* data (similar NCS) of any colour $nce^* = lab^*nce^*$ (0 ≤ n^* , c^* , e^* ≤ 1)

CIELAB data L^*_X , $C^*_{ab,X}$, $h_{ab,X}$, a^*_X , b^*_X of eight basic colours $X = RJGC^*BM^*NW$

Aim: Elementary colour data rgb^*_3 and LCH^* of the given colour

Elementary hue number of a colour	e^*	(0 ≤ e^* ≤ 1)	(1)
CIELAB hue angle of colour and maximum colour M	$h_{ab} = \text{function} [e^*]$	(with table or equation)	(2)
relative whiteness of the given colour	$w^* = 1 - n^* - c^*$		(3)
relative triangle lightness of the given colour	$t^* = 1 - n^* - 0,5 c^*$		(4)
rgb^*_3 data of maximum colour M	$r^*_{3,M} = \text{function} [h_{ab,a}]$	(with table or equation)	(5)
	$g^*_{3,M} = \text{function} [h_{ab,a}]$	(with table or equation)	(6)
	$b^*_{3,M} = \text{function} [h_{ab,a}]$	(with table or equation)	(7)
relative rgb^*_3 elementary colour data of the given colour	$r^*_3 = w^* + c^* r^*_{3,M}$		(8)
	$g^*_3 = w^* + c^* g^*_{3,M}$		(9)
	$b^*_3 = w^* + c^* b^*_{3,M}$		(10)
LCH^*_M data of maximum colour M	$L^*_M = \text{function} [h_{ab}]$	(with table or equation)	(11)
	$C^*_{ab,M} = \text{function} [h_{ab}]$	(with table or equation)	(12)
	$H^*_M = h_{ab}$		(13)
relative lightness of M	$l^*_M = [L^*_M - L^*_N] / [L^*_W - L^*_N]$		(14)
relative lightness of the given colour	$l^* = t^* + l^*_M c^* + 0,5 c^*$		(15)
LCH^* data of the given colour	$L^* = l^* [L^*_W - L^*_N] + L^*_N$		(16)
	$C^*_{ab} = c^* C^*_{ab,M}$		(17)
	$H^* = H^*_M$		(18)

ZE181-3

Equations: colorimetric data transfer from rgb^*_3 to nce^* data and LCH^* data

Given: Elementary colour data of any colour $rgb^*_3 = lab^*rgb^*_3$

CIELAB data L^*_X , $C^*_{ab,X}$, $h_{ab,X}$, a^*_X , b^*_X of eight basic colours $X = RJGC^*BM^*NW$

Aim: $nce^* = lab^*nce^*$ (similar to NCS data) and LCH^* data of the given colour (0 ≤ e^* ≤ 1)

relative chroma of the given colour	$c^* = \max [rgb^*_3] - \min [rgb^*_3]$		(1)
relative blackness of the given colour	$n^* = 1 - \max [rgb^*_3]$		(2)
relative triangle lightness of the given colour	$t^* = 1 - n^* - 0,5 c^*$		(3)
relative red-green chroma in 60 degree system s	$a^*_{rs} = r^*_3 \cos(30) + g^*_3 \cos(150)$		(4)
relative yellow-blue chroma in 60 degree system s	$b^*_{rs} = r^*_3 \sin(30) + g^*_3 \sin(150) + b^*_3 \sin(270)$		(5)
hue angle in 60 degree system s	$h_{ab,s} = \arctan [b^*_{rs} / a^*_{rs}]$	(0 ≤ $h_{ab,s}$ ≤ 360)	(6)
CIELAB hue angle in 60 degree system s	$h_{ab} = h_{ab,s}$		(7)
elementary hue number of the given colour	$e^* = \text{function} [h_{ab}]$	(with table or equation)	(8)
CIELAB LCH^*_M data of maximum colour M	$L^*_M = \text{function} [h_{ab}]$	(with table or equation)	(9)
	$C^*_{ab,M} = \text{function} [h_{ab}]$	(with table or equation)	(10)
	$h_{ab,M} = h_{ab}$		(11)
relative lightness of maximum colour M	$l^*_M = [L^*_M - L^*_N] / [L^*_W - L^*_N]$		(12)
relative lightness of the given colour	$l^* = t^* + l^*_M c^* + 0,5 c^*$		(13)
CIELAB LCH^* data of the given colour	$L^* = l^* [L^*_W - L^*_N] + L^*_N$		(14)
	$C^*_{ab} = c^* C^*_{ab,M}$		(15)
	$h_{ab} = h_{ab,M}$		(16)

ZE181-7

BAM-test chart ZE18; colorimetric coordinate transfer
Equations for the transfer between olv^*_3 , LCH^* and nce^*

input: rgb (-> olv^*_3) $setrgbcolor$
output: no change compared to input