

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

Given: Elementary colour data of any colour $rgb^*_3 = lab^*rgb^*_3$ (in example M located between R and J)

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 NCS) and LCH^* (CIELAB) data of the given colour ($0 \leq e^* \leq 1$)

$$\text{relative chroma of the given colour} \quad c^* = \max [rgb^*_3] - \min [rgb^*_3] \quad (1)$$

$$\text{relative blackness of the given colour} \quad n^* = 1 - \max [rgb^*_3] \quad (2)$$

$$\text{relative triangle lightness of the given colour} \quad t^* = 1 - n^* - 0,5 c^* \quad (3)$$

$$\text{relative red-green chroma in standard system s} \quad a^*_{rs} = r^*_3 \cos(30) + g^*_3 \cos(150) \quad (4)$$

$$\text{relative yellow-blue chroma in standard system s} \quad b^*_{rs} = r^*_3 \sin(30) + g^*_3 \sin(150) + b^*_3 \sin(270) \quad (5)$$

$$\text{hue angle in standard system s} \quad h_{ab,s} = \arctan [b^*_{rs} / a^*_{rs}] \quad (0 \leq h_{ab,s} \leq 360) \quad (6)$$

$$\text{CIELAB hue angle of maximum colour } M \quad h_{ab,M} = \text{function} [h_{ab,s}] \quad (\text{with table or equation}) \quad (7)$$

$$\text{elementary hue number of the given colour} \quad e^* = \text{function} [h_{ab,M}] \quad (\text{with table or equation}) \quad (8)$$

$$\text{Relative device hue angle ratio of } M \quad \alpha_M = [h_{ab,M} - h_{ab,R}] / [h_{ab,J} - h_{ab,R}] \quad (9)$$

$$\text{CIELAB data } L^*_M, a^*_M, b^*_M, C^*_{ab,M} \text{ of } M \quad L^*_M = \alpha_M L^*_J + (1 - \alpha_M) L^*_R \quad (10)$$

$$a^*_M = \alpha_M a^*_J + (1 - \alpha_M) a^*_R \quad (11)$$

$$b^*_M = \alpha_M b^*_J + (1 - \alpha_M) b^*_R \quad (12)$$

$$C^*_{ab,M} = [a^{*2}_M + b^{*2}_M]^{1/2} \quad (13)$$

$$\text{relative lightness } l^* \text{ of the given colour} \quad l^* = t^* + c^* [L^*_M - L^*_N] / [L^*_W - L^*_N] - 0,5 c^* \quad (14)$$

$$\text{CIELAB data } LCH^* \text{ of the given colour} \quad L^* = L^*_N + l^* [L^*_W - L^*_N] \quad (15)$$

$$C^*_{ab} = c^* C^*_{ab,M} \quad (16)$$

$$h_{ab} = h_{ab,M} \quad (17)$$