

Color space CIELAB 1976, color values, -attributes, -chromaticities (a' , b')

tristimulus values X, Y, Z $\rightarrow$ color attributes L^*, a^*, b^*

lightness $L^* = 116 (Y/Y_n)^{1/3} - 16$

RG-chromaticness $a^* = 500 [(X/X_n)^{1/3} - (Y/Y_n)^{1/3}] = 500 [a' - a'_n] Y^{1/3}$

JB-chromaticness $b^* = 200 [(Y/Y_n)^{1/3} - (Z/Z_n)^{1/3}] = 500 [b' - b'_n] Y^{1/3}$

color attributes L^*, a^*, b^* $\rightarrow$ tristimulus values X, Y, Z

tristimulus values $X = X_n [(L^* + 16) / 116 + a^*/500]^3$

$$Y = Y_n [(L^* + 16) / 116]^3$$

$$Z = Z_n [(L^* + 16) / 116 - b^*/200]^3$$

chromaticity for CIELAB 1976, LABHNU 1977, LABHNU1 1979

CIELAB 1976, 2° $a' = 0,2191 (x/y)^{1/3}$ $b' = -0,08376 (z/y)^{1/3}$

LABHNU 1977 $a' = (x/y + 1/6)^{1/3} / 4$ $b' = - (z/y + 1/6)^{1/3} / 12$

LABHNU1 1979 $a' = (x/y + 1) / 15$ *linear!* $b' = - (z/y + 1/6)^{1/3} / 12$

LABHNU2 1979 $a' = (x/y + 1/6)^{2/3} / 15$ $b' = - (z/y + 1/6)^{1/3} / 12$

CIELAB 1976, 10° $a' = 0,2193 (x_{10} / y_{10})^{1/3}$ $b' = -0,08417 (z_{10} / y_{10})^{1/3}$

chromaticity constants $a_2 = 500 (1/X_n)^{1/3} = 0,2191$ $b_2 = -200 (1/Z_n)^{1/3} = -0,08376$

CIELAB, $2^\circ, 10^\circ$ $a_{10} = 500 (1/X_{n10})^{1/3} = 0,2193$ $b_{10} = -200 (1/Z_{n10})^{1/3} = -0,08417$