FORMULARIO DE CIENCIA DEL COLOR

Especificación triestímulo general: $Y(C)=\sum_{i=1}^{3} Y_C(P_i)$

Valores triestímulo: $T_i(C)=\dfrac{Y_C(P_i)}{Y_W(P_i)}, \quad i=1,2,3$

Leyes de Grassmann: $\begin{cases} T_i\left(C\equiv\sum_{k=1}^{n} C_k\right)=\sum_{k=1}^{n} T_i(C_k) \\ T_i(kC)=kT_i(C),\ k\in\Re \end{cases}, \quad i=1,2,3$

Coordenadas cromáticas: $\begin{cases} t_i(C)=\dfrac{T_i(C)}{\sum_{k=1}^{3} T_k(C)} \\ T_i(C)=\dfrac{Y(C)}{\sum_{k=1}^{3} Y_W(P_k)\,t_k(C)}\,t_i(C) \end{cases}, \quad i=1,2,3$

Funciones de igualación $\begin{cases} V(\lambda)=\sum_{i=1}^{3} Y_W(P_i)\,\overline{T}_i(\lambda) \\ T_i(C)=k_m\sum_{k=1}^{N} C(\lambda_k)\,\overline{T}_i(\lambda_k)\,\Delta\lambda \quad , \quad k_m=683\ \text{lm/W} \end{cases}, \quad i=1,2,3$

Regla del centro de gravedad: $\dfrac{t_i(C)-t_i(C_1)}{t_i(C_2)-t_i(C)}=\dfrac{S(C_2)}{S(C_1)}=\dfrac{\sum_{k=1}^{3} T_k(C_2)}{\sum_{k=1}^{3} T_k(C_1)}, \quad i=1,2,3$

Pureza de excitación: $p_e=\left|\dfrac{t_i(C)-t_i(W)}{t_i(\lambda_d)-t_i(W)}\right|=\dfrac{S(\lambda_d)}{S(C)}, \quad i=1,2,3$

Pureza colorimétrica: $p_c=\dfrac{Y(\lambda_d)}{Y(W)+Y(\lambda_d)}=\dfrac{\sum_{i=1}^{3} Y_W(P_i)\,t_i(\lambda_d)}{\sum_{i=1}^{3} Y_W(P_i)\,t_i(C)}\,p_e$

Especificación triestímulo CIE-XYZ: *S* = iluminante ,

ρ/τ = objeto opaco/transparente

$$X = k \sum_{\lambda=380}^{780} S(\lambda)\rho(\lambda)\bar{x}(\lambda)\Delta\lambda$$

$$Y = k \sum_{\lambda=380}^{780} S(\lambda)\rho(\lambda)\bar{y}(\lambda)\Delta\lambda \quad , \quad \text{con} \quad k = \frac{100}{\sum_{\lambda=380}^{780} S(\lambda)\bar{y}(\lambda)\Delta\lambda}$$

$$Z = k \sum_{\lambda=380}^{780} S(\lambda)\rho(\lambda)\bar{z}(\lambda)\Delta\lambda$$

Si C(λ) es un estímulo-color auto-luminoso (LED, pantalla, lámpara, etc) con valores radiométricos se cambia *k* por k_m = 683 lm/W.

Coordenadas cromáticas: $\begin{cases} x = \dfrac{X}{X+Y+Z} \quad , \quad y = \dfrac{Y}{X+Y+Z} \quad , \quad x+y+z=1 \\ X = \dfrac{x}{y}Y \, , \quad Z = \dfrac{1-x-y}{y}Y \end{cases}$

Regla del centro de gravedad: $S(C) = \dfrac{Y(C)}{y(C)} \quad , \quad \dfrac{x-x_1}{x_2-x} = \dfrac{y-y_1}{y_2-y} = \dfrac{Y_2/y_2}{Y_1/y_1}$

Pureza de excitación: $p_e = \left| \dfrac{CW}{W\lambda_d} \right|$

Pureza colorimétrica: $p_c = \dfrac{Y(\lambda_d)}{Y(W)+Y(\lambda_d)} = \dfrac{y(\lambda_d)}{y} p_e$

Espacio de color CIE-L*a*b*C*h*:

$$L^* = 116\left(\frac{Y}{Y_n}\right)^{\frac{1}{3}} - 16$$

$$a^* = 500\left[\left(\frac{X}{X_n}\right)^{\frac{1}{3}} - \left(\frac{Y}{Y_n}\right)^{\frac{1}{3}}\right] \quad ; \quad C^*_{ab} = \sqrt{\left(a^*\right)^2 + \left(b^*\right)^2}$$

$$b^* = 200\left[\left(\frac{Y}{Y_n}\right)^{\frac{1}{3}} - \left(\frac{Z}{Z_n}\right)^{\frac{1}{3}}\right] \quad ; \quad h^*_{ab} = arctg\left(\frac{b^*}{a^*}\right) \text{en deg}$$

Colorimetría diferencial: fórmula mejorada CIE-TC1 29 (1994)

$$\Delta E = \sqrt{\left(\Delta L^*\right)^2 + \left(\Delta a^*\right)^2 + \left(\Delta b^*\right)^2} = \sqrt{\left(\Delta L^*\right)^2 + \left(\Delta C^*_{ab}\right)^2 + \left(\Delta H^*_{ab}\right)^2} \quad , \quad \Delta H^*_{ab} = 2\sqrt{C^*_{std} C^*_m}\ \text{sen}\left(\frac{\Delta h^*_{ab}}{2}\right)$$

$$\Delta E_{94} = \sqrt{\left(\frac{\Delta L^*}{k_L S_L}\right)^2 + \left(\frac{\Delta C^*_{ab}}{k_C S_C}\right)^2 + \left(\frac{\Delta H^*_{ab}}{k_H S_H}\right)^2} \quad , \quad S_L = 1,\ S_C = 1 + 0.045 C^*_{std},\ S_H = 1 + 0.015 C^*_{std}$$