

higher colour metric (color data: nonlinear relation to CIE 1931 data)

nonlinear color terms	name and relationship with tristimulues or chromaticity values	notes
lightness	$L^* = 116 (Y / 100)^{1/3} - 16 \quad (Y > 0,8)$ approximation: $L^*=100 (Y/100)^{1/2,4} \quad (Y > 0)$	CIELAB 1976
chroma red-green yellow-blue radial	<i>nonlinear transform chromatic values A, B</i> $a^* = 500 [(X / X_n)^{1/3} - (Y / Y_n)^{1/3}]$ $= 500 (a' - a'_n) Y^{1/3}$ $b^* = 200 [(Y / Y_n)^{1/3} - (Z / Z_n)^{1/3}]$ $= 500 (b' - b'_n) Y^{1/3}$ $C^*_{ab} = [a^{*2} + b^{*2}]^{1/2}$	CIELAB 1976 CIELAB 1976 <i>n=D65</i> <i>(background)</i>
chromaticity red-green yellow-blue radial	<i>nonlinear transform chromaticities x/y, z/y</i> $a' = (1 / X_n)^{1/3} (x / y)^{1/3}$ $= 0,2191 (x / y)^{1/3} \quad \text{for D65}$ $b' = - 0,4 (1 / Z_n)^{1/3} (z / y)^{1/3}$ $= - 0,08376 (z / y)^{1/3} \quad \text{for D65}$ $c'_{ab} = [(a' - a'_n)^2 + (b' - b'_n)^2]^{1/2}$	<i>compare to log cone excitation</i> $\log[\text{L} / (\text{L}+\text{M})]$ $= \log[\text{P} / (\text{P}+\text{D})]$ $\log[\text{S} / (\text{L}+\text{M})]$ $= \log[\text{T} / (\text{P}+\text{D})]$