

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

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