Lightness L^* and differences ΔY or dY in the colour space CIELAB

The lightness L^* is defined by the equation:

$$L^* = 116 \, (Y/Y_n)^{1/3} - 16, \qquad Y_n = 100, \; Y_u = 18, \; 1 \leq Y \leq 100 \qquad [1]$$

This CIELAB equation as function of relative tristimulus values is

$$L^* = k_u (Y/Y_u)^{1/3} - 16, \qquad k_u = 116 \, [Y_u/Y_n]^{1/3} = 65{,}50 \qquad [2]$$

The tristimulus values difference dY is for $dL^* = 1$

$$dY = (3/116) \cdot (Y/Y_n)^{2/3} = a \cdot (Y/Y_n)^{2/3} = b \cdot (Y/Y_u)^{2/3} \qquad [3]$$

$$a = 0{,}557 \quad b = 6{,}516 \qquad [4]$$

Relative nomalized differences are dY/Y_u and $[Y/dY] \, / \, [(Y/dY)_u]$

$$dY/Y_u = (Y/Y_n)^{2/3} = [(Y/Y_n)^{2/3}] \, / \, [(Y_u/Y_n)^{2/3}] \qquad [5]$$

$$(Y/dY) \, / \, (Y/dY)_u = [Y/Y_u]^{1/3} \qquad [6]$$

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