LABJND modifications of the colour space and the colour-difference formula by line elements for different applications

Example line element in lightness direction of *Stiles* (1946), who uses the luminance L instead of the tristimulus value Y.

$L^*(Y) = s \ln[1+9Y]$ s=scaling factor [1a]

$d(L^*(Y)) / dY = 9s / [1+9Y]$ [2a]

For this derivation, and for the lightness threshold $d(L^*(Y))=1$ it is valid:

$dY = [1+9Y] / 9s$ [3a]

For the normalization with the surround values $Y_u=18$, dY_u and $L^*(Y_u)$:

$dY/dY_u = [1+9Y] / [1+9Y_u]$ [4a]

$L^*(Y) / L^*(Y_u) = \ln[1+9Y] / \ln[1+9Y_u]$ [5a]

For the LABJND colour-difference formula according to CIE 230:2019:

$dY/dY_u = [A_1+A_2Y] / [A_1+A_2Y_u]$ $A_1=0{,}0170$, $A_2=0{,}0058$ [1b]

It is valid with the definition $A_{2u}=A_2Y_u/A_1=6{,}141$

$dY/dY_u = [1+A_{2u}(Y/Y_u)] / [1+A_{2u}]$ [2b]

$L^*(Y) / L^*(Y_u) = \ln[1+A_{2u}(Y/Y_u)] / \ln[1+A_{2u}]$ [3b]

Line elements for the LABJND-colour space are NOT included in CIE 230.

The value of A_{2u} is known for many applications, for example as function of the distance, the presentation time and the luminance of the samples.