LABJND colour-difference formula of CIE 230:2019
Main integral equations with Y and Y_n of surround u

$$dY = A_1[1+A_2Y] \qquad \text{error } 0,0044 \qquad A_1=0{,}0170,\ A_2=0{,}3343 \qquad [5d]$$
$$dY_r = A_1[1+A_{2n}Y_n] \qquad A_1=0{,}0170,\ A_{2n}=5{,}931,\ Y_r=(Y/Y_n) \qquad [6d]$$

$$\frac{1}{A_1}\int\frac{dY}{1+A_2Y} = \frac{1}{A_1A_2}\ln|1+A_2Y| = F^*(Y) \qquad (A_2{=}1)\ [5i]$$

$$dY = A_1[1+A_2Y]A_3 \qquad \text{error } 0,0018 \qquad A_1=0{,}0251,\ A_2=0{,}1566,\ A_3=1{,}107 \qquad [7d]$$
$$dY_r = A_1[1+A_{2n}(Y_n)]^{A_3} \qquad A_1=0{,}0251,\ A_{2n}=2{,}778,\ A_3=1{,}107 \qquad [8d]$$

$$\frac{1}{A_1}\int\frac{dY}{[1+A_2Y]^{A_3}} = \frac{1}{A_1}\frac{[1+A_2Y]^{(A_3+1)}}{A_2(A_3+1)} = F^*(Y) \qquad (A_2{\neq}1)\ [7i]$$

tex10-1u

LABJND colour-difference formula of CIE 230:2019
Main integral equations with $Y_r=Y/Y_n$ of surround u

$$dY = A_1[1+A_2Y] \qquad \text{error } 0,0044 \qquad A_1=0{,}0170,\ A_2=0{,}3343 \qquad [5d]$$
$$dY_r = A_1[1+A_{2n}Y_r] \qquad A_1=0{,}0170,\ A_{2n}=5{,}931,\ Y_r=(Y/Y_n) \qquad [6d]$$

$$\frac{1}{A_1}\int\frac{dY_r}{1+A_{2n}Y_r} = \frac{1}{A_1A_{2n}}\ln|1+A_{2n}Y_r| = F^*(Y_r) \qquad (A_2{=}1)\ [6i]$$

$$dY = A_1[1+A_2Y]A_3 \qquad \text{error } 0,0018 \qquad A_1=0{,}0251,\ A_2=0{,}1566,\ A_3=1{,}107 \qquad [7d]$$
$$dY_r = A_1[1+A_{2n}(Y_r)]^{A_3} \qquad A_1=0{,}0251,\ A_{2n}=2{,}778,\ A_3=1{,}107 \qquad [8d]$$

$$\frac{1}{A_1}\int\frac{dY_r}{[1+A_{2n}Y_r]^{A_3}} = \frac{1}{A_1}\frac{[1+A_{2n}Y_r]^{(A_3+1)}}{A_{2n}(A_3+1)} = F^*(Y_r) \qquad (A_2{\neq}1)\ [8i]$$

tex10-2u

LABJND colour-difference formula of CIE 230:2019
Modifications with normalization to Y_n of surround

$$dY = A_1+A_2Y \qquad \text{error } 0,0044 \qquad A_1=0{,}0170,\ A_2=0{,}0058 \qquad [1]$$
$$=A_1+A_{2n}(Y/Y_n) \qquad A_1=0{,}0170,\ A_{2n}=0{,}1004=A_2Y_n \qquad [2]$$

$$dY = A_1+A_2Y^{A_3} \qquad \text{error } 0,0019 \qquad A_1=0{,}0258,\ A_2=0{,}0036,\ A_3=1{,}087 \qquad [3]$$
$$=A_1+A_{2n}(Y/Y_n)^{A_3} \qquad A_1=0{,}0258,\ A_{2n}=0{,}0823,\ A_3=1{,}087 \qquad [4]$$

$$dY = A_1[1+A_2Y] \qquad A_1=0{,}0170,\ A_2=0{,}3343 \qquad [5]$$
$$=A_1[1+A_{2n}(Y/Y_n)] \qquad A_1=0{,}0170,\ A_{2n}=5{,}931=A_2Y_n \qquad [6]$$

$$dY = A_1[1+A_2Y]^{A_3} \qquad \text{error } 0,0018 \qquad A_1=0{,}0251,\ A_2=0{,}1566,\ A_3=1{,}107 \qquad [7]$$
$$=A_1[1+A_{2n}(Y/Y_n)]^{A_3} \qquad A_1=0{,}0251,\ A_{2n}=2{,}778,\ A_3=1{,}107 \qquad [8]$$

tex10-3u DEQ30-3N

LABJND colour-difference formula of CIE 230:2019
Modifications with normalization to Y_n of surround

$$dY = A_1+A_2Y \qquad \text{error } 0,0044 \qquad A_1=0{,}0170,\ A_2=0{,}0058 \qquad [1d]$$
$$=A_1+A_{2n}(Y/Y_n) \qquad A_1=0{,}0170,\ A_{2n}=0{,}1004=A_2Y_n \qquad [2d]$$

$$\int\frac{dY}{A_1+A_2Y} = \frac{1}{A_2}\ln|A_1+A_2Y| = F^*(Y) \qquad (A_2{=}1)\ [1i]$$

$$dY = A_1+A_2Y^{A_3} \qquad \text{error } 0,0019 \qquad A_1=0{,}0258,\ A_2=0{,}0036,\ A_3=1{,}087 \qquad [3d]$$
$$=A_1+A_{2n}(Y/Y_n)^{A_3} \qquad A_1=0{,}0258,\ A_{2n}=0{,}0823,\ A_3=1{,}087 \qquad [4d]$$

$$dY = A_1[1+A_2Y] \qquad A_1=0{,}0170,\ A_2=0{,}3343 \qquad [5d]$$
$$=A_1[1+A_{2n}(Y/Y_n)] \qquad A_1=0{,}0170,\ A_{2n}=5{,}931=A_2Y_n \qquad [6d]$$

$$\int\frac{dY}{1+A_2Y} = \frac{1}{A_1A_2}\ln|1+A_2Y| = F^*(Y) \qquad (A_2{=}1)\ [5i]$$

tex10-4u DEQ30-4N

LABJND colour-difference formula of CIE 230:2019
Modifications with normalization to Y_n of surround

$$dY = A_1+A_2Y \qquad \text{error } 0,0044 \qquad A_1=0{,}0170,\ A_2=0{,}0058 \qquad [1d]$$
$$=A_1+A_{2n}Y_r \qquad A_1=0{,}0170,\ A_{2n}=0{,}1004,\ Y_r=(Y/Y_n) \qquad [2d]$$

$$\int\frac{dY_r}{A_1+A_2Y_r} = \frac{1}{A_2}\ln|A_1+A_2Y_r| = F^*(Y_r) \qquad (A_2{=}1)\ [2i]$$

$$dY = A_1[1+A_2Y] \qquad A_1=0{,}0170,\ A_2=0{,}3343 \qquad [5d]$$
$$=A_1[1+A_{2n}Y_r] \qquad A_1=0{,}0170,\ A_{2n}=5{,}931,\ Y_r=(Y/Y_n) \qquad [6d]$$

$$\frac{1}{A_1}\int\frac{dY_r}{1+A_{2n}Y_r} = \frac{1}{A_1A_{2n}}\ln|1+A_{2n}Y_r| = F^*(Y_r) \qquad (A_2{=}1)\ [6i]$$

tex10-5u DEQ30-5N

LABJND colour-difference formula of CIE 230:2019
Modifications with normalization to Y_n of surround

$$dY = A_1+A_2Y^{A_3} \qquad \text{error } 0,0019 \qquad A_1=0{,}0258,\ A_2=0{,}0036,\ A_3=1{,}087 \qquad [3d]$$
$$=A_1+A_{2n}(Y/Y_n)^{A_3} \qquad A_1=0{,}0258,\ A_{2n}=0{,}0826,\ A_3=1{,}087 \qquad [4d]$$

$$\int\frac{dY}{A_1+A_2[Y]^{A_3}} = A_1Y + \frac{A_2[Y]^{(A_3+1)}}{A_3+1} = F^*(Y) \qquad (A_2{\neq}1)\ [3i]$$

$$dY = A_1[1+A_2Y]^{A_3} \qquad \text{error } 0,0018 \qquad A_1=0{,}0251,\ A_2=0{,}1566,\ A_3=1{,}107 \qquad [7d]$$
$$=A_1[1+A_{2n}(Y/Y_n)]^{A_3} \qquad A_1=0{,}0251,\ A_{2n}=2{,}778,\ A_3=1{,}107 \qquad [8d]$$

$$\frac{1}{A_1}\int\frac{dY}{[1+A_2Y]^{A_3}} = \frac{1}{A_1}\frac{[1+A_2Y]^{(A_3+1)}}{A_2(A_3+1)} = F^*(Y) \qquad (A_2{\neq}1)\ [7i]$$

tex10-6u DEQ30-6N

LABJND colour-difference formula of CIE 230:2019
Modifications with normalization to Y_n of surround

$$dY = A_1+A_2Y^{A_3} \qquad \text{error } 0,0019 \qquad A_1=0{,}0258,\ A_2=0{,}0036,\ A_3=1{,}087 \qquad [3d]$$
$$=A_1+A_{2n}(Y/Y_n)^{A_3} \qquad A_1=0{,}0258,\ A_{2n}=0{,}0823,\ A_3=1{,}087 \qquad [4d]$$

$$\int\frac{dY_r}{A_1+A_{2n}[Y_r]^{A_3}} = A_1Y_r + \frac{A_{2n}[Y_r]^{(A_3+1)}}{A_3+1} = F^*(Y_r) \qquad (A_2{\neq}1)\ [4i]$$

$$dY = A_1[1+A_2Y]^{A_3} \qquad \text{error } 0,0018 \qquad A_1=0{,}0251,\ A_2=0{,}1566,\ A_3=1{,}107 \qquad [7d]$$
$$=A_1[1+A_{2n}(Y/Y_n)]^{A_3} \qquad A_1=0{,}0251,\ A_{2n}=2{,}778,\ A_3=1{,}107 \qquad [8d]$$

$$\frac{1}{A_1}\int\frac{dY_r}{[1+A_{2n}Y_r]^{A_3}} = \frac{1}{A_1}\frac{[1+A_{2n}Y_r]^{(A_3+1)}}{A_{2n}(A_3+1)} = F^*(Y_r) \qquad (A_2{\neq}1)\ [8i]$$

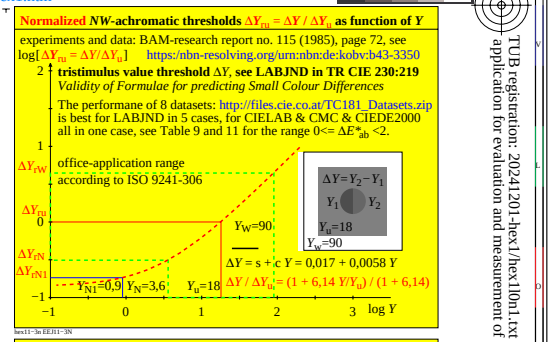
tex10-7u DEQ30-7N

Normalized *NW*-achromatic thresholds $\Delta Y_{ru} = \Delta Y / \Delta Y_u$ as function of Y

experiments and data: BAM-research report no. 115 (1985), page 72, see
$\log[\Delta Y_{ru} = \Delta Y/\Delta Y_u]$ https://nbn-resolving.org/urn:nbn:de:kobv:b43-3350

tristimulus value threshold ΔY, see LABJND in TR CIE 230:2019
Validity of Formulae for predicting Small Colour Differences

The performane of 8 datasets: http://files.cie.co.at/TC181_Datasets.zip is best for LABJND in 5 cases, for CIELAB & CMC & CIEDE2000 all in one case, see Table 9 and 11 for the range $0 <= \Delta E^*_{ab} <2$.



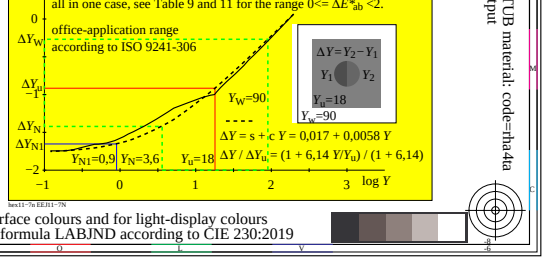
tex11-3u EEJ11−3N

***NW*-achromatic thresholds ΔY as function of Y**

experiments and data: BAM-research report no. 115 (1985), page 72, see
$\log[\Delta Y]$ https://nbn-resolving.org/urn:nbn:de:kobv:b43-3350

tristimulus value threshold ΔY, see LABJND in TR CIE 230:2019
Validity of Formulae for predicting Small Colour Differences

The performane of 8 datasets: http://files.cie.co.at/TC181_Datasets.zip is best for LABJND in 5 cases, for CIELAB & CMC & CIEDE2000 all in one case, see Table 9 and 11 for the range $0 <= \Delta E^*_{ab} <2$.



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