

Colorimetric data for system lines NRS18 -> ORS18, TLS00, NRS18, SRS18

For input LCH^*_{a0} (NRS18) and output LCH^*_{am} for 4 systems ($m = 0$ to 4)
Six CIELAB hue angles of device ORS18: (37.7 96.4 150.9 236.0 305.0 353.7);
Six CIELAB hue angles of device TLS00: (40.0 102.8 136.0 196.4 306.3 328.2);
Six CIELAB hue angles of device NRS18: (25.5 92.3 162.2 217.0 271.7 328.6);
Six CIELAB hue angles of device SRS18: (30.0 90.0 150.0 210.0 270.0 330.0);

no. Colour	->NRS18 LCH^*_{a0}	->NRS18 n^*, c^*, H^*_{ai0}	ORS18 LCH^*_{a1}	TLS00 LCH^*_{a2}	NRS18 LCH^*_{a3}	SRS18 LCH^*_{a4}
01 R=r00j	52.8 38.5 25	0.3 0.5 25	48.5 35.6 25	45.0 48.1 25	52.8 38.5 25	52.8 37.0 25
02 r10j	52.8 36.2 32	0.3 0.5 32	48.5 36.6 32	44.7 50.9 32	52.8 36.2 32	52.8 38.0 32
03 r20j	52.8 34.4 39	0.3 0.5 39	48.9 40.8 39	44.4 54.8 39	52.8 34.4 39	52.8 35.9 39
04 r30j	52.8 33.1 46	0.3 0.5 46	51.5 38.6 46	46.3 47.4 46	52.8 33.1 46	52.8 34.5 46
05 r40j	52.8 32.5 52	0.3 0.5 52	53.6 37.3 52	48.4 45.4 52	52.8 32.5 52	52.8 33.8 52
06 r50j	52.8 32.3 59	0.3 0.5 59	56.2 36.4 59	50.7 43.9 59	52.8 32.3 59	52.8 33.5 59
07 r60j	52.8 32.6 66	0.3 0.5 66	58.7 36.0 66	53.1 43.0 66	52.8 32.6 66	52.8 33.7 66
08 r070j	52.8 33.2 72	0.3 0.5 72	60.9 36.1 72	55.1 42.8 72	52.8 33.2 72	52.8 34.3 72
09 r80j	52.8 34.4 79	0.3 0.5 79	63.4 36.8 79	57.4 43.2 79	52.8 34.4 79	52.8 35.4 79
10 r90j	52.8 36.3 86	0.3 0.5 86	65.9 38.1 86	59.8 44.3 86	52.8 36.3 86	52.8 37.3 86
11 J=j00g	52.8 38.6 92	0.3 0.5 92	68.1 39.7 92	61.8 45.8 92	52.8 38.6 92	52.8 38.0 92

Goal: Transfer coordinates LCH^*_{a0} (system m=0) to LCH^*_{am} (system m=1 to 4)

The given data LCH^*_{a0} include the device hue H^*_{a0}

Integer (i) device hue: $H^*_{ai0} = \text{round} (H^*_{a0})$ (1)

Fetch device data $LCH^*_{a,M0}$ from table with 361 entries for H^*_{ai0} from 0 to 360 degrees
Lightness, chroma, hue: $LCH^*_{a,M0} = LCH^*_{a,M0} [H^*_{ai0}]$ (2)

Calculate lcw^* data from LC^*_{a0} and $LC^*_{a,M0}$:

Relative lightness: $l^* = [L^*_{a0} - L^*_{N0}] / [L^*_{W0} - L^*_{N0}]$ (3)

Relative chroma: $c^* = C^*_{a0} / C^*_{a,M0}$ (4)

Relative Blackness: $n^* = 1 - l^* + c^* [L^*_{M0} - L^*_{N0}] / [L^*_{W0} - L^*_{N0}]$ (5)

Fetch device data $LCH^*_{a,Mm}$ from table with 361 entries for H^*_{ai0} from 0 to 360 degrees
lightness, chroma, hue: $LCH^*_{a,Mm} = LCH^*_{a,Mm} [H^*_{ai0}]$ (6)

For any input or output device ($m=0$ to 4) it is valid for constant n^*, c^*, l^*, H^*_a :

CIELAB lightness: $L^*_m = L^*_{am} = L^*_{Nm} + l^* [L^*_{Wm} - L^*_{Nm}]$ (7)

Adated CIELAB chroma: $C^*_{am} = c^* C^*_{a,Mm}$ (8)

Adated CIELAB hue: $H^*_{am} = H^*_{a0}$ (9)

Result: device dependent adapted CIELAB data of 4 systems m=1 to 4:

lightness, chroma, hue: LCH^*_{am} (10)

Colorimetric data for system lines NRS18 -> ORS18, TLS00, NRS18, SRS18

For input olv^*_{30} (NRS18) and output LCH^*_{am} for 4 systems ($m = 0$ to 4)
Six CIELAB hue angles of device ORS18: (37.7 96.4 150.9 236.0 305.0 353.7);
Six CIELAB hue angles of device TLS00: (40.0 102.8 136.0 196.4 306.3 328.2);
Six CIELAB hue angles of device NRS18: (25.5 92.3 162.2 217.0 271.7 328.6);
Six CIELAB hue angles of device SRS18: (30.0 90.0 150.0 210.0 270.0 330.0);

no. Colour	->NRS18 $olv^*_{30}=rgb^*_{30}n^*, c^*, H^*_{si0}$	->NRS18 LCH^*_{a1}	ORS18 LCH^*_{a2}	TLS00 LCH^*_{a3}	NRS18 LCH^*_{a4}	SRS18 LCH^*_{a5}
01 R=r00j	0.7 0.2 0.2 0.3 0.5 30	48.5 35.6 25	45.0 48.1 25	52.8 38.5 25	52.8 37.0 25	
02 r10j	0.7 0.25 0.2 0.3 0.5 35	48.5 36.6 32	44.7 50.9 32	52.8 36.2 32	52.8 38.0 32	
03 r20j	0.7 0.3 0.2 0.3 0.5 41	48.9 40.8 39	44.4 54.8 39	52.8 34.4 39	52.8 35.9 39	
04 r30j	0.7 0.35 0.2 0.3 0.5 47	51.5 38.6 46	46.3 47.4 46	52.8 33.1 46	52.8 34.5 46	
05 r40j	0.7 0.4 0.2 0.3 0.5 53	53.6 37.3 52	48.4 45.4 52	52.8 32.5 52	52.8 33.8 52	
06 r50j	0.7 0.45 0.2 0.3 0.5 60	56.2 36.4 59	50.7 43.9 59	52.8 32.3 59	52.8 33.5 59	
07 r60j	0.7 0.5 0.2 0.3 0.5 67	58.7 36.0 66	53.1 43.0 66	52.8 32.6 66	52.8 33.7 66	
08 r070j	0.7 0.55 0.2 0.3 0.5 73	60.9 36.1 72	55.1 42.8 72	52.8 33.2 72	52.8 34.3 72	
09 r80j	0.7 0.6 0.2 0.3 0.5 79	63.4 36.8 79	57.4 43.2 79	52.8 34.4 79	52.8 35.4 79	
10 r90j	0.7 0.65 0.2 0.3 0.5 85	65.9 38.1 86	59.8 44.3 86	52.8 36.3 86	52.8 37.3 86	
11 J=j00g	0.7 0.7 0.2 0.3 0.5 90	68.1 39.7 92	61.8 45.8 92	52.8 38.6 92	52.8 38.0 92	

Goal: Transfer coordinates olv^*_{30} (system m=0) to LCH^*_{am} (system m=1 to 4)

The following equations for relative blackness and chroma are valid for any device:

$$n^* = 1 - \max (o^*_{30}, l^*_{30}, v^*_{30}) \quad (1)$$

$$c^* = \max (o^*_{30}, l^*_{30}, v^*_{30}) - \min (o^*_{30}, l^*_{30}, v^*_{30}) \quad (2)$$

For the calculation of the missing relative device hue assume

as a starting point that the three values olv^*_{30} belong to the standard (s) device SRS18:

relative red-green chroma: $a^*_{r0} = o^*_{30} \cos(30) + l^*_{30} \cos(150)$ (3)

relative yellow-blue chroma: $b^*_{r0} = o^*_{30} \sin(30) + l^*_{30} \sin(150) - v^*_{30} \sin(270)$ (4)

Standard integer hue: $H^*_{si0} = \text{round} [\text{atan} (b^*_{r0} / a^*_{r0})]$ (5)

Fetch device integer hue: $H^*_{ai0} = H^*_{si-ai} [H^*_{si0}]$ (6)

Fetch device data $LCH^*_{a,M0}$ from table with 361 entries for H^*_{ai0} from 0 to 360 degrees

Lightness, chroma, hue: $LCH^*_{a,M0} = LCH^*_{a,M0} [H^*_{ai0}]$ (7)

Fetch device data $LCH^*_{a,Mm}$ from table with 361 entries for H^*_{ai0} from 0 to 360 degrees

lightness, chroma, hue: $LCH^*_{a,Mm} = LCH^*_{a,Mm} [H^*_{ai0}]$ (8)

For any input or output device ($m=0$ to 4) it is valid for constant n^*, c^*, l^*, H^*_a :

CIELAB lightness: $L^*_m = L^*_{am} = L^*_{Nm} + l^* [L^*_{Wm} - L^*_{Nm}]$ (9)

Adated CIELAB chroma: $C^*_{am} = c^* C^*_{a,Mm}$ (10)

Adated CIELAB hue: $H^*_{am} = H^*_{a,M0} = H^*_{a,Mm}$ (11)

Result: device dependent adapted CIELAB data of 4 systems m=1 to 4:

lightness, chroma, hue: LCH^*_{am} (12)