

Colorimetric data for system lines TLS70 -> ORS18, TLS00, NRS18, SRS18

For input LCH^*_{a0} (TLS70) and output olv^*_{3m} 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	->TLS70 LCH^*_{a0}	->TLS70 n^*, c^*, H^*_{ai0}	ORS18 olv^*_{31}	TLS00 olv^*_{32}	NRS18 olv^*_{33}	SRS18 olv^*_{34}
01 O=000y	78.2 14.1 22	0.3 0.5 22	0.7 0.2 0.38	0.7 0.2 0.33	0.7 0.2 0.23	0.7 0.2 0.27
02 o10y	79.0 12.6 30	0.3 0.5 30	0.7 0.2 0.29	0.7 0.2 0.27	0.7 0.23 0.2	0.7 0.2 0.2
03 o20y	80.0 11.5 39	0.3 0.5 39	0.7 0.21 0.2	0.7 0.2 0.21	0.7 0.3 0.2	0.7 0.27 0.2
04 o30y	80.9 10.9 48	0.3 0.5 48	0.7 0.29 0.2	0.7 0.26 0.2	0.7 0.37 0.2	0.7 0.35 0.2
05 o40y	81.7 10.5 56	0.3 0.5 56	0.7 0.36 0.2	0.7 0.33 0.2	0.7 0.43 0.2	0.7 0.42 0.2
06 o50y	82.6 10.4 65	0.3 0.5 65	0.7 0.43 0.2	0.7 0.4 0.2	0.7 0.5 0.2	0.7 0.49 0.2
07 o60y	83.4 10.5 73	0.3 0.5 73	0.7 0.5 0.2	0.7 0.46 0.2	0.7 0.56 0.2	0.7 0.56 0.2
08 o70y	84.4 10.9 82	0.3 0.5 82	0.7 0.58 0.2	0.7 0.53 0.2	0.7 0.62 0.2	0.7 0.63 0.2
09 o80y	85.2 11.5 90	0.3 0.5 90	0.7 0.65 0.2	0.7 0.6 0.2	0.7 0.68 0.2	0.7 0.7 0.2
10 o90y	86.1 12.6 99	0.3 0.5 99	0.68 0.7 0.2	0.7 0.67 0.2	0.65 0.7 0.2	0.62 0.7 0.2
11 Y=y00l	86.9 14.1 107	0.3 0.5 107	0.6 0.7 0.2	0.64 0.7 0.2	0.59 0.7 0.2	0.56 0.7 0.2

Goal: Transfer coordinates LCH^*_{a0} (system m=0) to $rgb_m = olv^*_{3m}$ (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 $LCH^*_{a,Mm}$ 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 $olv^*_{3,Mm}$ from table with 361 entries for H^*_{ai0} from 0 to 360 degrees
"red, green, blue" rgb_{Mm} data: $olv^*_{3,Mm} = olv^*_{3,Mm} [H^*_{ai0}]$ (6)

For any input or output device (m=0 to 4) it is valid for constant n^*, c^*, l^*, H^*_a :
"red, green, blue" rgb_m data: $olv^*_{3m} = 1 - n^* - c^* + c^* olv^*_{3,Mm}$ (7)

Result: device dependent relative CIELAB data of 4 systems m=1 to 4:
"red, green, blue" rgb_m data: $rgb_m = olv^*_{3m}$ (8)

Colorimetric data for system lines TLS70 -> ORS18, TLS00, NRS18, SRS18

For input olv^*_{30} (TLS70) and output olv^*_{3m} 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	->TLS70 olv^*_{30}	->TLS70 n^*, c^*, H^*_{si0}	ORS18 olv^*_{31}	TLS00 olv^*_{32}	NRS18 olv^*_{33}	SRS18 olv^*_{34}
01 O=000y	0.7 0.2 0.2 0.3 0.5 30	0.7 0.2 0.38	0.7 0.2 0.38	0.7 0.2 0.33	0.7 0.2 0.23	0.7 0.2 0.27
02 o10y	0.7 0.25 0.2 0.3 0.5 35	0.7 0.2 0.29	0.7 0.2 0.29	0.7 0.2 0.27	0.7 0.23 0.2	0.7 0.2 0.2
03 o20y	0.7 0.3 0.2 0.3 0.5 41	0.7 0.21 0.2	0.7 0.21 0.2	0.7 0.2 0.21	0.7 0.3 0.2	0.7 0.27 0.2
04 o30y	0.7 0.35 0.2 0.3 0.5 47	0.7 0.29 0.2	0.7 0.29 0.2	0.7 0.26 0.2	0.7 0.37 0.2	0.7 0.35 0.2
05 o40y	0.7 0.4 0.2 0.3 0.5 53	0.7 0.36 0.2	0.7 0.36 0.2	0.7 0.33 0.2	0.7 0.43 0.2	0.7 0.42 0.2
06 o50y	0.7 0.45 0.2 0.3 0.5 60	0.7 0.43 0.2	0.7 0.43 0.2	0.7 0.4 0.2	0.7 0.5 0.2	0.7 0.49 0.2
07 o60y	0.7 0.5 0.2 0.3 0.5 66	0.7 0.5 0.2	0.7 0.5 0.2	0.7 0.46 0.2	0.7 0.56 0.2	0.7 0.56 0.2
08 o70y	0.7 0.55 0.2 0.3 0.5 73	0.7 0.58 0.2	0.7 0.58 0.2	0.7 0.53 0.2	0.7 0.62 0.2	0.7 0.63 0.2
09 o80y	0.7 0.6 0.2 0.3 0.5 79	0.7 0.65 0.2	0.7 0.65 0.2	0.7 0.6 0.2	0.7 0.68 0.2	0.7 0.7 0.2
10 o90y	0.7 0.65 0.2 0.3 0.5 85	0.68 0.7 0.2	0.7 0.67 0.2	0.65 0.7 0.2	0.62 0.7 0.2	0.62 0.7 0.2
11 Y=y00l	0.7 0.7 0.2 0.3 0.5 90	0.6 0.7 0.2	0.64 0.7 0.2	0.59 0.7 0.2	0.56 0.7 0.2	0.56 0.7 0.2

Goal: Transfer coordinates olv^*_{30} (system m=0) to olv^*_{3m} (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 $olv^*_{3,Mm}$ from table with 361 entries for H^*_{ai0} from 0 to 360 degrees

"red, green, blue" rgb_m data: $olv^*_{3,Mm} = olv^*_{3,Mm} [H^*_{ai0}]$ (7)

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

"red, green, blue" rgb_m data: $olv^*_{3m} = 1 - n^* - c^* + c^* olv^*_{3,Mm}$ (8)

Result: device dependent relative CIELAB data of 4 systems m=1 to 4:
"red, green, blue" rgb_m data: $rgb_m = olv^*_{3m}$ (9)