

Colorimetric data for system lines NLS00 -> ORS18, TLS00, NRS18, SRS18

For input LCH^*_{a0} (NLS00) 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	->NLS00 LCH^*_{a0}	->NLS00 n^*, c^*, H^*_{ai0}	ORS18 LCH^*_{a1}	TLS00 LCH^*_{a2}	NRS18 LCH^*_{a3}	SRS18 LCH^*_{a4}
01 $O=o00y$	35.0 47.7 30	0.3 0.5 30	48.5 36.2 30	44.8 50.0 30	52.8 36.9 30	52.8 38.7 30
02 $o10y$	36.6 45.2 36	0.3 0.5 36	48.5 37.4 36	44.5 52.9 36	52.8 35.1 36	52.8 36.7 36
03 $o20y$	38.2 43.4 42	0.3 0.5 42	50.0 39.7 42	45.0 49.2 42	52.8 33.8 42	52.8 35.2 42
04 $o30y$	39.8 42.2 48	0.3 0.5 48	52.2 38.1 48	47.0 46.7 48	52.8 32.9 48	52.8 34.3 48
05 $o40y$	41.4 41.5 54	0.3 0.5 54	54.4 37.0 54	49.0 44.9 54	52.8 32.4 54	52.8 33.7 54
06 $o50y$	42.9 41.3 60	0.3 0.5 60	56.5 36.3 60	51.0 43.7 60	52.8 32.3 60	52.8 33.5 60
07 $o60y$	44.5 41.5 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 $o70y$	46.1 42.2 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 $o80y$	47.7 43.4 78	0.3 0.5 78	63.0 36.7 78	57.1 43.1 78	52.8 34.2 78	52.8 35.2 78
10 $o90y$	49.3 45.2 84	0.3 0.5 84	65.2 37.6 84	59.1 43.9 84	52.8 35.7 84	52.8 36.7 84
11 $Y=y00l$	50.9 47.7 90	0.3 0.5 90	67.4 39.1 90	61.1 45.2 90	52.8 37.7 90	52.8 38.7 90

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 NLS00 -> ORS18, TLS00, NRS18, SRS18

For input olv^*_{30} (NLS00) 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);

<i>no. Colour</i>	<i>->NLS00 olv*₃₀</i>					<i>->NLS00 n*, c*, H*_{si0}</i>				<i>ORS18 LCH*_{a1}</i>			<i>TLS00 LCH*_{a2}</i>			<i>NRS18 LCH*_{a3}</i>			<i>SRS18 LCH*_{a4}</i>		
01 <i>O=o00y</i>	0.7	0.2	0.2	0.3	0.5	30	48.5	36.2	30	44.8	50.0	30	52.8	36.9	30	52.8	38.7	30			
02 <i>o10y</i>	0.7	0.25	0.2	0.3	0.5	35	48.5	37.4	36	44.5	52.9	36	52.8	35.1	36	52.8	36.7	36			
03 <i>o20y</i>	0.7	0.3	0.2	0.3	0.5	41	50.0	39.7	42	45.0	49.2	42	52.8	33.8	42	52.8	35.2	42			
04 <i>o30y</i>	0.7	0.35	0.2	0.3	0.5	47	52.2	38.1	48	47.0	46.7	48	52.8	32.9	48	52.8	34.3	48			
05 <i>o40y</i>	0.7	0.4	0.2	0.3	0.5	53	54.4	37.0	54	49.0	44.9	54	52.8	32.4	54	52.8	33.7	54			
06 <i>o50y</i>	0.7	0.45	0.2	0.3	0.5	60	56.5	36.3	60	51.0	43.7	60	52.8	32.3	60	52.8	33.5	60			
07 <i>o60y</i>	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 <i>o70y</i>	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 <i>o80y</i>	0.7	0.6	0.2	0.3	0.5	79	63.0	36.7	78	57.1	43.1	78	52.8	34.2	78	52.8	35.2	78			
10 <i>o90y</i>	0.7	0.65	0.2	0.3	0.5	85	65.2	37.6	84	59.1	43.9	84	52.8	35.7	84	52.8	36.7	84			
11 <i>Y=y00l</i>	0.7	0.7	0.2	0.3	0.5	90	67.4	39.1	90	61.1	45.2	90	52.8	37.7	90	52.8	38.7	90			

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)