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);

	–>NRS18	–>NRS18	ORS18	TLS00	NRS18	SRS18
no. Colour	***LCH*a0***	***n*, c*, H*a0i***	***LCH*a1***	***LCH*a2***	***LCH*a3***	***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: $H^*_{ai0} = round\ (H^*_{a0})$ (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 ***lcnw*** data from ***LC*a0*** and ***LC*a,M0***:
Relative lightness: $l^* = [\ L^*_0 - L^*_{N0}\ ] / [\ L^*_{W0} - L^*_{N0}\ ]$ (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)

ZE030–7

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);

	–>NRS18	–>NRS18	ORS18	TLS00	NRS18	SRS18
no. Colour	***olv*30=rgb*30n*, c*, H*si0***		***LCH*a1***	***LCH*a2***	***LCH*a3***	***LCH*a4***
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 asume
as a starting point that the three values ***olv*30*** belong to the standard (s) device SRS18:
relative red-green chroma: $a^*_{s0} = o^*_{30}\ cos(30) + l^*_{30}\ cos(150)$ (3)
relative yellow-blue chroma: $b^*_{s0} = o^*_{30}\ sin(30) + l^*_{30}\ sin(150) - v^*_{30}\ sin(270)$ (4)
Standard integer hue: $H^*_{si0} = round\ [\ atan\ (\ b^*_{s0}\ /\ a^*_{s0}\ )\ ]$ (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)

ZE031–7