Colorimetric data for system line NRS18 −> NRS18

For input ***LCH*a0*** of the system 0: NRS18
Six CIELAB hue angles of device NRS18: (25.5 92.3 162.2 217.0 271.7 328.6);
and output ***LCH*a,M1***, ***olv*3,M1***, ***LCH*a1***, ***olv*31*** of the system 1: NRS18
Six CIELAB hue angles of device NRS18: (25.5 92.3 162.2 217.0 271.7 328.6);

no.	Colour	−>NRS18 LCH*a0			−>NRS18 n*, c*, H*ai0			NRS18 LCH*a,M1			NRS18 olv*3,M1			NRS18 LCH*a1			NRS18 olv*31		
01	R=r00j	52.8	38.5	25	0.3	0.5	25	56.7	77.1	25	1.0	0.0	0.01	52.8	38.5	25	0.7	0.2	0.2
02	r10j	52.8	36.2	32	0.3	0.5	32	56.7	72.4	32	1.0	0.1	0.0	52.8	36.2	32	0.7	0.25	0.2
03	r20j	52.8	34.4	39	0.3	0.5	39	56.7	68.7	39	1.0	0.2	0.0	52.8	34.4	39	0.7	0.3	0.2
04	r30j	52.8	33.1	46	0.3	0.5	46	56.7	66.3	46	1.0	0.31	0.0	52.8	33.1	46	0.7	0.35	0.2
05	r40j	52.8	32.5	52	0.3	0.5	52	56.7	65.1	52	1.0	0.4	0.0	52.8	32.5	52	0.7	0.4	0.2
06	r50j	52.8	32.3	59	0.3	0.5	59	56.7	64.6	59	1.0	0.5	0.0	52.8	32.3	59	0.7	0.45	0.2
07	r60j	52.8	32.6	66	0.3	0.5	66	56.7	65.1	66	1.0	0.61	0.0	52.8	32.6	66	0.7	0.5	0.2
08	r070j	52.8	33.2	72	0.3	0.5	72	56.7	66.3	72	1.0	0.7	0.0	52.8	33.2	72	0.7	0.55	0.2
09	r80j	52.8	34.4	79	0.3	0.5	79	56.7	68.8	79	1.0	0.8	0.0	52.8	34.4	79	0.7	0.6	0.2
10	r90j	52.8	36.3	86	0.3	0.5	86	56.7	72.6	86	1.0	0.91	0.0	52.8	36.3	86	0.7	0.65	0.2
11	J=j00g	52.8	38.6	92	0.3	0.5	92	56.7	77.1	92	1.0	1.0	0.0	52.8	38.6	92	0.7	0.7	0.2

0 1

Goal: Transfer coordinates ***LCH*a0*** (system m=0) to ***LCH*a1*** and ***olv*31*** (system m=1)
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 $LCH^*_{a,M1}$ and $olv^*_{3,M1}$ from table with 361 entries for H^*_{ai0}
lightness, chroma, hue: $LCH^*_{a,M1} = LCH^*_{a,M1}\ [\ H^*_{ai0}\ ]$ (6)
"Red, Green, Blue"rgb_1 data:-Data: $olv^*_{3,M1} = olv^*_{3,M1}\ [\ H^*_{ai0}\ ]$ (7)

For any input or output device (m=0 to 1) it is valid for constant ***n*, c*, l*, H*a***:
CIELAB lightness: $L^*_1 = L^*_{a1} = L^*_{N1} + l^*\ [\ L^*_{W1} - L^*_{N1}\ ]$ (8)
Adated CIELAB chroma: $C^*_{a1} = c^*\ C^*_{a,M1}$ (9)
Adated CIELAB hue: $H^*_{a1} = H^*_{a0}$ (10)
"red, green, blue" rgb_1 data: $olv^*_{31} = 1 - n^* - c^* + c^*\ olv^*_{3,M1}$ (11)

Result: device dependent adapted and relative CIELAB data of system m=1:
lightness, chroma, hue: ***LCH*a1*** and rgb_1 data: ***olv*31*** (12)

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Colorimetric data for system line NRS18 −> NRS18

For input ***olv*30*** of the system 0: NRS18
Six CIELAB hue angles of device NRS18: (25.5 92.3 162.2 217.0 271.7 328.6);
and output ***LCH*a,M1***, ***olv*3,M1***, ***LCH*a1***, ***olv*31*** of the system 1: NRS18
Six CIELAB hue angles of device NRS18: (25.5 92.3 162.2 217.0 271.7 328.6);

no.	Colour	−>NRS18 olv*30=rgb*30			−>NRS18 n*, c*, H*si0			NRS18 LCH*a,M1			NRS18 olv*3,M1			NRS18 LCH*a1			NRS18 olv*31		
01	R=r00j	0.7	0.2	0.2	0.3	0.5	30	56.7	77.1	25	1.0	0.0	0.01	52.8	38.5	25	0.7	0.2	0.2
02	r10j	0.7	0.25	0.2	0.3	0.5	35	56.7	72.4	32	1.0	0.1	0.0	52.8	36.2	32	0.7	0.25	0.2
03	r20j	0.7	0.3	0.2	0.3	0.5	41	56.7	68.7	39	1.0	0.2	0.0	52.8	34.4	39	0.7	0.3	0.2
04	r30j	0.7	0.35	0.2	0.3	0.5	47	56.7	66.3	46	1.0	0.31	0.0	52.8	33.1	46	0.7	0.35	0.2
05	r40j	0.7	0.4	0.2	0.3	0.5	53	56.7	65.1	52	1.0	0.4	0.0	52.8	32.5	52	0.7	0.4	0.2
06	r50j	0.7	0.45	0.2	0.3	0.5	60	56.7	64.6	59	1.0	0.5	0.0	52.8	32.3	59	0.7	0.45	0.2
07	r60j	0.7	0.5	0.2	0.3	0.5	67	56.7	65.1	66	1.0	0.61	0.0	52.8	32.6	66	0.7	0.5	0.2
08	r070j	0.7	0.55	0.2	0.3	0.5	73	56.7	66.3	72	1.0	0.7	0.0	52.8	33.2	72	0.7	0.55	0.2
09	r80j	0.7	0.6	0.2	0.3	0.5	79	56.7	68.8	79	1.0	0.8	0.0	52.8	34.4	79	0.7	0.6	0.2
10	r90j	0.7	0.65	0.2	0.3	0.5	85	56.7	72.6	86	1.0	0.91	0.0	52.8	36.3	86	0.7	0.65	0.2
11	J=j00g	0.7	0.7	0.2	0.3	0.5	90	56.7	77.1	92	1.0	1.0	0.0	52.8	38.6	92	0.7	0.7	0.2

0 1

Goal: Transfer coordinates ***olv*30*** (system m=0) to ***LCH*a1*** and ***olv*31*** (system m=1)
The following equations for relative blackness and chroma are valid for any device:
$n^* = 1 - max\ (\ o^*_{30}, l^*_{30}, v^*_{30}\ )$ (1)
$c^* = max\ (\ o^*_{30}, l^*_{30}, v^*_{30}\ ) - min\ (\ o^*_{30}, l^*_{30}, v^*_{30}\ )$ (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: $a^*_{r0} = o^*_{30}\ cos(30) + l^*_{30}\ cos(150)$ (3)
relative yellow-blue chroma: $b^*_{r0} = o^*_{30}\ sin(30) + l^*_{30}\ sin(150) - v^*_{30}\ sin(270)$ (4)
Standard integer hue: $H^*_{si0} = round\ [\ atan\ (\ b^*_{r0} / a^*_{r0}\ )\ ]$ (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 $LCH^*_{a,M1}$ from table with 361 entries for H^*_{ai0} from 0 to 360 degrees
lightness, chroma, hue: $LCH^*_{a,M1} = LCH^*_{a,M1}\ [\ H^*_{ai0}\ ]$ (8)

For any input or output device (m=0 to 1) it is valid for constant ***n*, c*, l*, H*a***:
CIELAB lightness: $L^*_1 = L^*_{a1} = L^*_{N1} + l^*\ [\ L^*_{W1} - L^*_{N1}\ ]$ (9)
Adated CIELAB chroma: $C^*_{a1} = c^*\ C^*_{a,M1}$ (10)
Adated CIELAB hue: $H^*_{a1} = H^*_{a,M0} = H^*_{a,M1}$ (11)
"red, green, blue" rgb_1 data: $olv^*_{31} = 1 - n^* - c^* + c^*\ olv^*_{3,M1}$ (12)

Result: device dependent adapted and relative CIELAB data of system m=1:
lightness, chroma, hue: ***LCH*a1*** and rgb_1 data: ***olv*31*** (13)

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