

## Lightness $L^*_{\text{JND}}$ for the Just Noticeable Difference (JND)

For adjacent surface colours in the range  $0,0036 < R < 0,90$

or the digital range  $1/255 = 0,0039 < R < 1,00$  it is valid:

$$L^*_{\text{JND}} = a (R/R_n)^k \quad [1] \quad a=572; R_n=1,00; k=0,14=1/7,2$$

$$= b (R/R_u)^k \quad [2] \quad b=a(R_u/R_n)^k=450; R_u=0,18$$

For  $R=R_u$  it is valid:  $L^*_{\text{JNDu}}=450$ .

Derivation of equation [2] gives with  $1-k = 0,86$ :

$$\delta(L^*_{\text{JND}})/\delta R = c (R/R_u)^{1-k} \quad [3] \quad c = (b k)/R_u = 63/18 = 3,5$$

or for the treshhold  $\delta(L^*_{\text{JND}})=1$

$$\delta R = d (R/R_u)^{1-k} \quad [4] \quad d = R_u/(b k) = 18/63 = 0,29$$

For the surround lightness  $L^*_{\text{JNDu}}=450$  with  $R=R_u$  the threshold is

$\delta R_{\text{JNDu}} = 0,29$ . This threshold is *independent* of  $k$ .