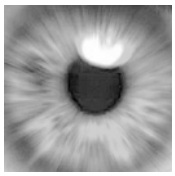

MPRT - influence of speed

Objective

In order to minimize the total time consumption for measuring the MPRT of displays, the influence of velocity on the luminance distribution is of great importance.
An experiment has been carried out, where the luminance distribution due to shift in grey level has been measured for several velocities of a moving target.

Set up

A (moving) target of size 119 × 39 pixels with the grey level of 170 on a background grey level of 56 was loaded into a Quantum 881C video generator. The image was shown on a 60 Hz 1280× 1024 LCD monitor. The velocities investigated were 0, 1, 2, 4, 6, 8, 10, 12 and 15 pixels per frame.
The luminance distribution was measured with an ICAM 2D colorimeter and the MPRT application software from DELTA Light & Optics, Denmark.

ICAM isplaced in front of the display under investigation and the V-Sync signal from the Quantum 881C is connected to ICAM to ensure synchronization between the display refresh period and the integration timing of ICAM.
The MPRT application controls the measurement timings. With a special 'trigger hold-off' it is possible to average over a number of 'events' to improve the S/N. An event is here defined as the situation where the moving target is in the exact same pixel position on the display.

Results

The integration period is, in this test, set to match a LCD frame period corresponding to 16.666 ms (60 Hz).
In figure 1 the measurement images are shown for the target moving with the velocities investigated.

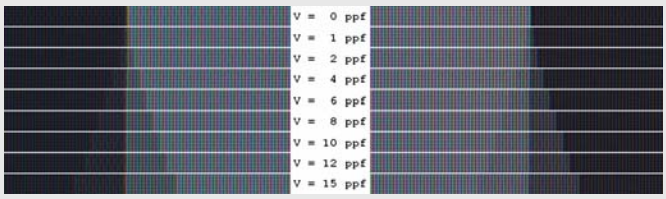

Figure 1. Measurement images as function of velocity. Right side shows leading edge and left side shows trailing edge. The data shown is an average of 16 events. The velocity is increased from 0 to 15 pixels per frame from top to bottom.

In figure 2 the luminances are given for each velocity. It is seen that the luminance distribution is close to be independent of the velocity.

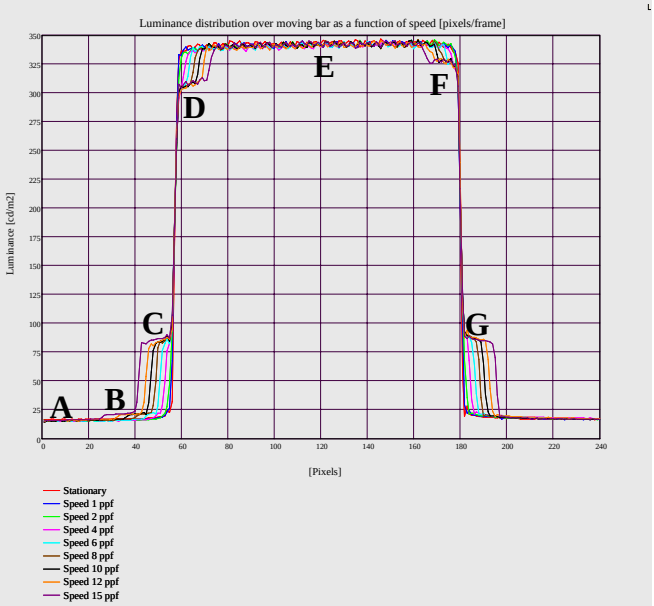

Figure 2. Luminance distributions as function of velocity.

In table 1 the variation of the luminance levels for the pixel positions A through G is evaluated. At each position (A through G) the luminance level for each velocity (V=1 ppf is not included) is found. From these levels the average, the standard deviation and the coefficient of variation (CV) is calculated. See table 1.

Table 1. Luminance levels at positions A through G

Position	Average [cd×m^{-2}]	Stdev [cd×m^{-2}]	CV [%]
A	15.4	0.23	1.5
B	21.2	0.37	1.8
C	84.3	0.63	0.75
D	306	1.49	0.49
E	341	0.66	0.19
F	328	1.91	0.58
G	87.9	1.37	1.6

Conclusion

From table 1 is seen that the MPRT measurement will be independent (as expected) of the target speed.

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