PWDAS-10

ADDITIVITY OF GLARE SENSITIVITY USING LED LIGHTS AT MESOPIC BACKGROUND LIGHT LEVELS

Fekete Judit[1], Várady Géza[2], Sik-Lányi Cecilia[3] and Schanda János[3]

[1]University of Pécs, Faculty of Health Sciences, Hungary
[2]University of Pécs, Pollack Mihály Faculty of Engineering, Hungary
[3]University of Pannonia, Virtual Environments and Imaging Technologies Laboratory, Hungary

Human vision at night is a complex phenomenon. Planning the proper light source for that condition is a grand challenge in these days. Vision at night-time driving falls into the mesopic region. This is the range where we know the operation of our visual organ inadequately. Car headlamps ought to ensure good illumination also during mesopic conditions, but at the present, this is not satisfying at all.

The last few years demonstrated that LEDs accomplish a revolution and could have many advantages in car headlamps. Their rigid construction is a major advantage, using different base materials and phosphors the light spectrum could be optimized for best vision on the road. But for this the visibility and glare functions of the human eye under mesopic conditions should be known precisely.

We conducted experiments at the University of Pannonia, at the Virtual Environment and Lighting Laboratory to examine connection between better visibility and the possibilities of decreasing discomfort glare.

Earlier investigations showed that there is a slight difference between the mesopic eye sensitivity and the glare spectral sensitivity of the human observer. Critical in this respect is that most investigations were carried out with monochromatic radiation, supposing the validity of Abney's law. Additivity experiments for mesopic visibility have shown considerable non-additvity.

We now performed similar experiments with narrow band emissions in the following form: Three LEDs have been selected, a red, a green and a yellow emitting. The red and green emitting chips were in the same housing, so their light could be mixed easily, producing the same colour as that of the yellow LED.

The paper will show how large differences occure for a given glare level (just tolerable) if the yellow light is produced by the additive mixture of the red and green LED lights, or by the yellow light emitting LED, compared to the glare sensations when one or the other LED is switched on alone.