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Color Quality of Current and Future White LEDs: Optimization of Indoor Lighting Quality

Speakers Profile

Peter Bodrogis Senior Research Fellow at the Laboratory of Lighting Technology of the TechnischeUniversität Darmstadt in Darmstadt, Germany. He graduated in Physics from the LorándEötvös University of Budapest (Hungary). He obtained his PhD degree in Information Technology from the University of Pannonia in Veszprém, Hungary.
He obtained his Degree of Lecture Qualification (Habilitation) from the TechnischeUniversität Darmstadt in 2010 for his thesis on the optimization of modern visual technologies.

Abstract

An important aspect of lighting quality is color quality. Color quality has different aspects related to the color appearance of the colored objects in the room lit by the light source including color rendering, color preference, color harmony, chromatic lightness and color gamut. In this paper, these aspects are analyzed for fluorescent lamps and white LED light sources as well as colored objects in different color groups.Distortions of object color appearance due to the poor spectral properties of the light sources are pointed out and the corresponding object specific color rendering diagrams are shown.

Current warm, neutral and cool white LED spectra are presented and the relationship among chromatic lightness, color preference and color rendering is analyzed. It was found that modern white LED light sources are able to provide a better color quality than fluorescent lamps.Current and future optimization factors are summarized.It is expected that, instead of the photopic luminance based characterization of light sources, perceived whiteness, white preference,and the visual dimensions of color quality will play an important role in the future.

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